



**ROCKWELL INTERNATIONAL**  
NORTH AMERICAN SPACE OPERATIONS  
ROCKY FLATS PLANT

# **Remedial Investigation Report For 903 Pad, Mound, and East Trenches Areas**

## **Volume II**

**U S DEPARTMENT OF ENERGY**

**Rocky Flats Plant  
Golden Colorado**

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## 40 WASTE SOURCES CHARACTERIZATION

This section presents data from investigations of the waste storage and disposal areas at the 903 Pad Mound and East Trenches Areas. Waste quantities, location and composition are presented. Concentrations of hazardous substances and radionuclides identified above background levels are also provided along with other physical and chemical data.

This investigation focused on source characterization of past waste disposal sites (SWMUs) as preliminarily identified and located for the RCRA Part B Permit Application (Rockwell International 1986a) and the CEARP Phase I report (DOE 1986b). SWMU locations are herein revised and/or verified based on the additional data collected during this investigation. Plate 4.1 presents the revised SWMU locations.

Characterization of SWMUs is based on information regarding historical waste management practices and on data collected during the 1986 and 1987 field investigation programs. Soil samples are the major source of data, but soil gas samples, ground water and surface water samples are also considered in characterizing the SWMUs. Plate 4.2 shows soil gas sample locations and Plates 4.3, 4.4, 4.5, 4.6 and 4.7 present soil gas data for tetrachloroethene (PCE), trichloroethene (TCE), carbon tetrachloride ( $\text{CCl}_4$ ), 1,1,1-trichloroethane (1,1,1-TCA) and 1,1-dichloroethene (DCE) respectively. Soil samples collected in 1987 have been analyzed for the parameters listed in Table 4.1. Selection of borehole locations is discussed in Appendix D.

**TABLE 4 1**  
**SOURCE SAMPLING PARAMETERS,**  
**SOIL AND WASTE SAMPLES**

**Metals**

Hazardous Substance List   Metals  
Beryllium  
Chromium (hexavalent)  
Lithium  
Strontium

**Organics**

Hazardous Substances List  
Oil and Grease

**Radionuclides**

Gross Alpha  
Gross Beta  
Uranium 233 234 and 238  
Americium 241  
Plutonium 239  
Strontium 90  
Cesium 137  
Tritium

**Other**

Characteristics (e.g. ignitability corrosivity reactivity)  
pH

In order to facilitate a clear and concise discussion of soil contamination at the various SWMUs in the 903 Pad Mound and East Trenches Areas observations pertaining to uranium and trace metals and some organics are summarily discussed here. Many of the organics detected in the samples are considered to represent laboratory artifact and examination of all the data indicates uranium and trace metals are not contaminants of the soils.

The presence of Hazardous Substance List (HSL) organics in soil samples at concentrations above detection limits are indicative of contamination provided these organics are not present in laboratory blanks for the samples. Such data are discussed under the SWMU subsections. However, the presence of an HSL organic in a laboratory blank and sample does not necessarily imply laboratory artifact if the concentration in the sample greatly exceeded the laboratory blank concentration. For some soil samples collected for this investigation this has been the case and these data are also discussed under the SWMU subsections. Conversely, there are many samples for which HSL organics are present at concentrations on the same order as those found in the blanks. These data are discussed below.

Analytical data for most of the soil samples collected for this investigation indicate the presence of methylene chloride, acetone, and bis(2-ethylhexyl)phthalate and occasionally 2-butanone, N-nitrosodiphenylamine, di-n-octyl phthalate, and di-n-butyl phthalate. The analytical data are shown in Tables 4.2 and 4.3. Inspection of the data indicates the following: methylene chloride generally was present at low or estimated (below detection limit) concentrations and often appeared in the blanks; acetone was almost always detected in the blanks and its occurrence in samples was often at concentrations within a factor of 2 to 3 of that observed in the blanks; 2-butanone was generally present in samples only at estimated concentrations below

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2-Butanone
** Batch 3122-471 **				
3122-471-001	BH02871214	34	46	-
3122-471 002	BH148708W2	48	100	-
3122-471-003	BH148206CT	27	85	-
3122 471-004	BH138711CT	28	22	-
3122-471-005	BH02870012	23	18	-
3122-471 006	BH028718BR	36	78	-
3122-471 007	BH148702W1	47	48	-
3122 471 008	BH148709BR	38	44	-
3122 471 009	BH098711CT	12	15	-
3122-471 009 MS	BH098711CT	10	15	-
3122-471-009 MSD	BH098711CT	14	-	-
3122 471 011	BH24870002	47 B	43 B	-
3122-471 011-MS	BH24870002	21 B	34 B	-
3122 471-011 MSD	BH24870002	18 B	116	-
3122 471 012	BH248710WS	19 B	60 B	-
3122 471 013	BH268703CT	18 B	14 B	-
3122-471-014	BH26870003	20 B	23	-
3122-471 015	BH37870005	10	25	-
3122-471 016	BH37870005D	37	28	-
3122 471-017	BH30870010	32 B	124 B	-
** Batch 8705 057 **				
8705 057-0001BL	BLANK	25 J	45 J	-
8705-057-0002BL	BLANK	10 J	25 J	-
8705-057-0010	BH07870BR	590 B	100 B	66
8705 057-0030	BH078710WS	49 B	38 JB	130
8705 057 0050	BH07870510	210 B	63 B	79
8705-057 0070	BH078705CT	200 B	64 B	370
8705-057-0090	BH07871013	130 B	270 B	21 J
8705-057 0110	BH02871420	200 B	100 B	100
8705-057 0130	BH028714CT	49 B	82 B	75
** Batch 8705-059 **				
8705 059-0001BL	BLANK	25 J	45 J	-
8705-059-0010	BH128702CT	130 B	85 B	37 J

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
- Not detected (detection limit of 50 ug/kg)  
NA Not analyzed  
NS Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8705 059 0030	BH128705BR	130 B	66 B	27 J
8705 059 0030MS	BH128705BR MS	150 B	150 B	27 J
** Batch 8706-002 **				
8706 002-0001BL	BLANK	10 J	145	
8706-002 0010	BH098714BR	39 B	280 B	130
8706 002-0030	BH098706WT	63 B	110 B	390
8706 002 0050	BH09870010	39 B	93 B	
8706 002 0050MS	BH09870010 MS	43 B	130 B	-
** Batch 8706 004 **				
8706 004 0001BL	BLANK	10 J	145	
8706 004 0010	BH13870010	27 B	15 JB	
8706 004-0010MS	BH13870010 MS	110 B	120 B	150
8706-004 0030	BH138714BR	46 B	280 B	
8706-004 0050	GW287BH03	35 B	65 B	
** Batch 8706-005 **				
8706-005 0001BL	BLANK	25 J	20 J	-
8706 005 0010	BH08723BR	26 B	130 B	-
8706 005 0010MS	BH08723BR MS	33 B	71 B	91
8706 005 0030	BH10871020	46 B	100 B	-
8706 005 0050	BH10870010	29 B	50 JB	-
8706 005 0070	BH108720CT	36 B	150 B	
** Batch 8706 010 **				
8706 010 0001BL	BLANK	25 J	20 J	-
8706 010 0010	BH118711CT	35 B	130 B	
8706 010 0030	BH118714WT	66 B	160 B	
8706-010 0050	BH11870010	59 B	180 B	
8706 010 0050MS	BH11870010 MS	48 B	86 B	110
8706 010 0070	BH168706BR	35 B	75 B	-
8706 010 0090	BH168702CT	35 B	56 B	-
8706 010 0110	BH16870206	46 B	75 B	-
** Batch 8706 014 **				
8706 014 0001BL	BLANK	5 J	35 J	

Notes J Estimated concentration below detection limit  
B - Present in laboratory blank  
- Not detected (detection limit of 50 ug/kg)  
NA Not analyzed  
NS Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2-Butanone
8706 014 0002BL	BLANK	5 J	40 J	35 J
8706 014 0010	BH178708BR	19 JB	250 B	130 B
8706-014 0030	BH08870007	32 B	39 JB	33 J
8706 014 0050	BH178705CT	19 JB	40 JB	16 J
8706-014 0050MS	BH178705CT MS	26 B	110 B	120
8706 014-0070	BH088707CT	23 JB	31 JB	20 J
8706-014 0090	BH17870005	19 JB	33 JB	10 J
8706 014 0110	BH158726BR	37 B	48 JB	-
8706 014-0130	BH15870005	19 J	78	-
8706-014 0150	BH088710BR	19 J	46 J	-
8706-014 0170	BH15870510	15 JB	54 B	110 B
** Batch 8706 022 **				
8706-022 0001BL	BLANK	5 J	40 J	35 J
8706-022 0010	BH018701WT	10 JB	400 B	120 B
8706 022 0030	BH018704WS	12 JB	400 B	120 B
8706-022 0050	BH018710WS	10 JB	470 B	77 B
8706 022 0050MS	BH018710WS MS	16 J	750	180
** Batch 8706 024 **				
8706-024 0001BL	BLANK	5 J	40 J	35 J
8706-024-0010	BH048719BR	22 JB	650 B	150 B
8706-024-0010MS	BH048719BR MS	23 JB	1100 B	270 B
8706 024 0020	BH048715CT	11 JB	350 B	120 B
8706 024 0030	BH04870010	17 JB	200 B	110 B
8706-024 0040	BH048710WT	16 JB	490 B	110 B
** Batch 8706 042 **				
8706-042 0001BL	0616 BLANK		30 J	-
8706-042 0050	BH29870010	9 J	53 B	-
8706-042 0060	BH298717WT	10 J	430 B	-
8706 042 0070	BH298716BR	10 J	170 B	-
8706 042 0080	BH298713CT	11 J	430 B	-
** Batch 8706 058 **				
8706-058-0001BL	BLANK 6/23	-	40 J	

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
NA Not detected (detection limit of 50 ug/kg)  
NS Not analyzed  
NS - Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RfW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2-Butanone
8706 058 0010	BH30871020	13 J	220 B	33 J
8706 058 0020	BH308710WS	12 J	230 B	19 J
8706-058-0030	BH308720WT	7 J	180 B	9 J
8706 058-0040	BH308725BR	9 J	200 B	16 J
** Batch 8706-062 **				
8706 062 0001BL	BLANK 6/23	-	40 J	
8706 062 0002BL	BLANK1 6/23	10 J	20 J	
8706-062-0040	BH25870009D	15 J	44 J	
8706-062-0040MS	BH25870009D MS	-	-	-
8706-062-0040MSD	BH25870009D MSD	-	-	-
8706-062-0050	BH258718BR	150 JB	760 B	6 J
8706-062-0060	BH25870910	9 JB	70 B	
** Batch 8706-065 **				
8706-065 0001BL	BLANK 6/25	-	60 B	
8706 065 0002BL	BLANK1 6/26	-	70	
8706 065 0050	BH258709WT	12 J	340	16 J
8706-065 0060	BH258720WS	59 J	1100 B	150 J
8706 065 0070	BH25870009	19 J	110 B	
8706-065-0080	BH258716CT		1100 B	210 J
** Batch 8707-042 **				
8707-042 0001BL	BLANK		90	
8707 042 0040	BH23870008D	5 J	120 B	
8707-042 0050	BH238708CT	9 J	140 B	
8707-042 0060	BH23870008	6 J	110 B	58
8707 042 0070	BH238711BR	5 J	150 B	
** Batch 8707 043 **				
8707 043 0001BL	BLANK		90	
8707 043 0010	BH27870010	7 J	140 B	
8707 043 0020	BH278710CT	5 J	140 B	
8707-043 0030	BH278713BR	6 J	170 B	
** Batch 8707 045 **				
8707 045 0001BL	BLANK		90	

Notes J - Estimated concentration below detection limit  
B - Present in laboratory blank  
- - Not detected (detection limit of 50 ug/kg)  
NA - Not analyzed  
NS - Not spiked



TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2-Butanone
8707 045-0030	BH248708BR	7 J	55 B	-
8707 045 0040	BH248705CT	6 J	30 JB	-
** Batch 8707 046 **				
8707 046-0001BL	07/17 BLANK		25 J	-
8707 046 0040	BH228710WS	-	65 B	-
8707-046 0040MS	BH22870009 MS		78 B	-
8707 046-0050	BH22871018	-	66 B	-
8707 046 0060	BH22870009		48 JB	-
** Batch 8707 047 **				
8707-047 0001BL	07/17 BLANK	-	25 J	-
8707 047 0040	BH22870009D	-	56 B	-
8707-047-0050	BH228720CT	8 J	78 B	-
8707 047 0060	BH228722BR	9 J	73 B	-
** Batch 8707 059 **				
8707 059-0001BL	BLANK 7/18		30 J	-
8707-059 0030	BH288709BR		11 JB	-
8707 059 0040	BH288700WT	-	-	-
8707-059 0050	BH28870104		-	-
** Batch 8707 060 **				
8707 060 0001BL	BLANK		30 J	-
8707-060 0040	BH288705WS	12 J	58 B	-
8707 060 0050	BH288706CT	12 J	70 B	-
** Batch 8707-061 **				
8707 061 0001BL	BLANK	-	30 J	-
8707-061 0040	BH38870010	12 J	86 JB	-
8707-061 0050	BH388710WS	12 J	120 B	-
8707 061 0060	BH388720BR	12 J	87 B	-
** Batch 8707-073 **				
8707-073 0001BL	BLANK	5 J	15 J	-

Notes J = Estimated concentration below detection limit  
B Present in laboratory blank  
- Not detected (detection limit of 50 ug/kg)  
NA - Not analyzed  
NS Not spiked

TABLE 4-2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8707 073 0030	BH378705WS	12 J	99	-
8707 073 0040	BH268706BR	8 J	120	-
8707-073-0040MS	BH268706BR MS	10 J		
** Batch 8707-079 **				
8707 079 0001BL	BLANK	5 J	15 J	
8707 079 0040	BH37871113	17 JB	48 JB	
8707-079 0050	BH378725BR	17 JB	150 B	-
8707 079-0060	BH378721CT	12 JB	130 B	
** Batch 8707-082 **				
8707-082-0001BL	BLANK	5 J	15 J	-
8707 082 0070	BH368705WS	9 J	52	-
8707-082-0080	BH36870005	7 J	19 J	-
8707 082 0090	BH3687005D	9 J	53	-
8707 082 0110	BH36870515	11 J	51	-
8707 082 0120	BH368723BR	8 J	64	-
** Batch 8707 103 **				
8707-103-0001BL	BLANK		170	-
8707 103 0030	BH35870012		310	-
8707 103 0040	BH35870012D		360	-
** Batch 8707 106 **				
8707 106-0001BL	BLANK		170	-
8707 106 0040	BH358715CT		480	-
8707 106-0050	BH358718BR	-	280	-
8707 106 0060	BH35871215	-	-	-
** Batch 8707 110 **				
8707-110 0001BL	BLANK 8/7		170	-
8707 110-0002BL	BLANK 8/8	-	105	-
8707 110 0080	BH348718CT	-	210	-
8707-110 0090	BH348721BR	-	130	-
8707-110 0100	BH348715WS		150	-

Notes J Estimated concentration below detection limit  
B - Present in laboratory blank  
NA - Not detected (detection limit of 50 ug/kg)  
NS - Not analyzed  
NS - Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8707 110 0110	BH348708CL		350	
8707 110-0120	BH34870008		210	-
8707 110 0130	BH34870815		220	
8707 110 0140	BH3487815D		500	-
8707 110-0140MS	BH3487815D MS	-	-	-
** Batch 8708-002 **				
8708-002 0001BL	BLANK			
8708 002 0070	BH338720WT	15 J	70	-
8708 002 0080	BH338716CT	-	96	-
8708-002-0090	BH338719BR	14 J	170	-
8708-002-0100	BH33870004	-	320	-
8708-002 0110	BH33870815	-	130	-
8708-002 0120	BH3387815D	-	160	-
** Batch 8708 010 **				
8708-010 0001BL	BLANK			
8708 010 0060	BH328716CT	-	35 J	-
8708 010-0070	BH328718BR		86	-
8708 010-0080	BH32870008	9 J	170	-
8708 010 0090	BH32870815	9 J	99	-
8708 010-0100	BH3287815D	6 J	120	-
** Batch 8708 012 **				
8708 012-0001BL	BLANK			
8708 012-0050	BH31870013	-	70	-
8708 012-0060	BH31870013D	17 J	89	-
8708 012-0070	BH318713CT	10 J	70	-
8708 012-0080	BH318716BR	15 J	100	-
** Batch 8708 030 **				
8708 030-0001BL	BLANK 8/17			
8708-030 0002BL	BLANK 8/18	-	75	
8708 030-0130	BH398700FS	-	90	
8708 030 0140	BH398702DH	-	110	47 J
8708 030 0150	BH398704DH	-	79	40 J
			170	56

Notes J - Estimated concentration below detection limit  
B Present in laboratory blank  
- Not detected (detection limit of 50 ug/kg)  
NA Not analyzed  
NS Not spiked

TABLE 4-2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RtW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2-Butanone
8708 030-0160	BH398709FS		200	140
8708 030 0170	BH398712UC		150	48 J
8708 030 0170MS	BH398712UC MS		180 NS	50 NS
8708 030 0180	BH398714CT	-	170	72
8708 030 0190	BH398717BR	-	120	58
8708 030-0200	BH398719DH	-	140	55
8708 030 0210	BH398707DH	-	220	88
8708 030 0220	BH408704UC	-	140	-
8708 030 0230	BH408707C1	-	120	-
8708 030-0240	BH408709BR	-	150	-
** Batch 8708 041 **				
8708-041-0001BL	BLANK	-	90	-
8708 041-0060	BH41870912	-	210	-
8708 041-0070	BH418712UC	-	150	-
8708 041 0080	BH418714CT	-	210	-
8708 041-0090	BH418717BR	-	150	-
** Batch 8708 044 **				
8708 044 0001BL	BLANK	-	125	-
8708 044 0040	BH428717WT	-	71	-
8708 044-0050	BH42870709	-	100	-
** Batch 8708 047 **				
8708 047-0001BL	BLANK 8/22	-	125	-
8708 047 0002BL	BLANK 8/25	-	35 J	-
8708 047 0070	BH428727BR	-	140	-
8708 047-0080	BH428729DH	-	140	-
8708 047 0090	BH428732FS	-	68	-
8708 047 0100	BH428734FS	-	62	-
8708 047-0110	BH428737FS	-	110	-
8708 047-0120	BH428724DH	-	110 NS	-
8708 047-0120MS	BH428724DH MS	-	-	-
8708-047-0140	BH428722CT	-	-	-
** Batch 8708-049 **				
8708-049-0001BL	BLANK	-	125	-

Notes J Estimated concentration below detection limit  
B = Present in laboratory blank  
- = Not detected (detection limit of 50 ug/kg)  
NA = Not analyzed  
NS = Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RtW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8708 049 0020	BH428739FS		120	
** Batch 8708 053 **				
8708 053-0001BL	BLANK		35 J	
8708-053 0020	BH428745DH	-	78	-
** Batch 8709 002 **				
8709-002 0001BL	BLANK	-	-	
8709-002 0030	BH45870709	-	-	
8709-002 0040	BH45871417	-	-	-
** Batch 8709-007 **				
8709 007 0001BL	BLANK	-	-	
8709-007 0070	BH458717UC	-	-	
8709 007 0080	BH458720CT	-	-	
8709-007 0090	BH458722BR	-	-	
8709-007 0100	BH458725FS	-	-	
8709-007 0110	BH458727DH	-	-	
8709-007 0120	BH458730DH	-	-	
** Batch 8709 011 **				
8709-011 0001BL	BLANK			
8709-011 0030	BLANK			
8709-011-0040	BH458732FS	-	-	-
** Batch 8709 018 **				
8709 018 0001BL	BLANK			
8709-018 0030	BH46870709	-	-	-
8709-018 0040	BH46871719	-	-	-
** Batch 8709 023 **				
8709-023 0001BL	BLANK			
8709-023 0030	BH468724UC	-	160	-
8709 023-0040	BH468726CT	5 J	210 B	-

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
Not detected (detection limit of 50 ug/kg)  
NA - Not analyzed  
NS Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

R/W Batch ID	F eld Sample Number	Methylene Chloride	Acetone	2 Butanone
8709 023 0050	BH468729BR	7 J	270 B	
8709 023 0050MS	BH468729BR MS	6 J	260 BNS	
** Batch 8709 027 **				
8709-027 0001BL	BLANK	-	160	
8709-027 0080	BH438700FS	8 J	340	150
8709 027-0090	BH438702FS	12 J	240	100
8709 027 0100	BH438704DH	8 J	300	120
8709 027 0110	BH438707DH	10 J	290	120
8709 027 0120	BH438712DH	14 J	330	130
8709 027 0130	BH438714DH	15 J	290	110
8709 027 0140	BH438717DH	13 J	360	130
8709-027 0150	BH438709DH	13 J	290	110
8709-027 0160	BH4387407D	20 J	270	100
** Batch 8709 034 **				
8709 034 0001BL	BLANK 9/18	10 J	135	
8709-034 0050	BH438722DH	17 JB	130 B	
8709 034 0050 MS	BH438722DH MS	130 NS	240 NS	
8709 034-0060	BH438725UC	18 JB	120 B	
8709 034 0070	BH438727CT	47 B	130 B	
8709 034 0080	BH438730BR	210 B	160 B	
** Batch 8709-038 **				
8709-038 0001BL	BLANK	-	90	
8709-038 0080	BH448704DH	7 J	160 B	
8709 038-0090	BH448714DH	7 J	130 B	
8709 038 0100	BH448719DH	8 J	150 B	
8709 038-0110	BH448722DH	8 J	140 B	
8709 038-0120	BH448724DH	11 J	120 B	
8709 038 0130	BH448729WT	10 J	140 B	
8709 038 0140	BH448732BR	25 J	180 B	
** Batch 8709 043 **				
8709 043 0001BL	BLANK	15 J	100	40 J
8709 043 0050	BH568702DH	-		

Notes J = Estimated concentration below detection limit  
B = Present in laboratory blank  
- = Not detected (detection limit of 50 ug/kg)  
NA = Not analyzed  
NS = Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RfW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8709 043 0060	BH568704FS	-	-	-
8709 043 0070	BH568709DH	-	-	-
8709 043 0080	BH568712DH	-	-	-
8709 043 0080MS	BH568712DH MS	-	-	-
** Batch 8709-052 **				
8709 052 0001BL	BLANK			
8709 052 0020	BH478700FS	7 J	125	-
8709 052 0040	BH478702FS	-	84 B	-
8709 052 0060	BH478704DH	-	65 B	-
8709 052 0080	BH478706DH	-	77 B	-
8709 052 0100	BH478708DH	-	120 B	-
8709 052 0120	BH478709DH	-	8 J	-
8709 052 0140	BH478711DH	-	70 B	-
8709 052 0160	BH478713DH	6 J	93 B	-
8709 052 0170MS	BH568722BR MS	21 JNS	130 B	-
8709 052 0180	BH538700DH	11 J	120 BNS	-
8709 052 0200	BH538702DH	5 J	75 B	-
8709 052-0210	BH478715DH	-	61 B	-
8709 052 0230	BH538706DH	-	53 B	-
8709 052-0250	BH538708DH	6 J	58 B	-
8709 052 0270	BH568717WT	5 J	130 B	-
8709-052 0290	BH568720CT	48	74 B	-
8709 052 0310	BH568722BR	26	120 B	-
			110 B	-
** Batch 8709 058 **				
8709 058 0001BL	BLANK 9/18		90	40 J
8709 058 0002BL	BLANK 9/19	15 J	100	-
8709-058-0050	BH478716FS	11 JB	820 B	-
8709 058-0060	BH478720DH	12 JB	410 B	-
8709-058-0070	BH478721FS	15 JB	480 B	-
8709 058-0080	BH478722WT	11 JB	330 B	-
8709 058-0140	BH538714DH	10 JB	900 B	-
8709 058-0150	BH538716DH	10 JB	430 B	-
8709-058-0160	BH538719W1	10 JB	1600 B	-
8709 058 0170	BH538720CT	9 JB	2000 B	-
8709 058 0180	BH538722BR	9 JB	2400 B	-
** Batch 8709 061 **				
8709-061 0001BL	BLANK 9/21	5 J	95	-

Notes J - Estimated concentration below detection limit  
B - Present in laboratory blank  
- - Not detected (detection limit of 50 ug/kg)  
NA - Not analyzed  
NS - Not spiked

TABLE 4-2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RfW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2-Butanone
870J 061 0002BI	BLANK 9/21 1	5 J	170	-
8709 061 0040	BH478726CT	12 JB	190 B	-
870J 061-0050	BH4787026D	8 JB	480 B	-
8709 061 0060	BH478727BR	6 JB	770 B	-
8709 061-0080	BH548702WT	7 JB	300 B	-
8709 061-0180	BH558702DH	6 JB	810 B	-
8709 061-0190	BH558710DH	5 JB	540 B	-
8709-061 0200	BH558712WT	6 JB	1200 B	-
8709 061-0210	BH55871424	5 JB	850 B	-
8709 061 0220	BH558727UC	5 JB	1100 B	-
8709 061 0230	BH558729CT	8 JB	1200 B	-
8709 061 0240	BH558732BR	-	620 B	-
8709 061 0250	BH558732BRD	8 JB	380 B	-
8709 061 0260	BH558734DH	8 JB	300 B	-
** Batch 8709-064 **				
8709-064 0001BL	BLANK 9/22	5 J	85	-
8709 064 0050	BH548706DH	11 JB	270 B	-
8709-064 0060	BH548708DH	9 JB	200 B	-
8709 064 0070	BH548710DH	13 JB	150 B	-
8709 064-0080	BH548712DH	9 JB	290 B	-
8709 064 0080MS	BH548712DH MS	46 BNS	520 BNS	-
8709-064 0100	BH48870006	11 JB	100 B	-
** Batch 8709 065 **				
8709 065 0001BL	BLANK	10 J	75	60
8709-065-0040	BH488710UC	-	220 B	-
8709 065-0050	BH488713CT	-	1200 B	-
8709-065 0060	BH488715BR	-	480 B	-
8709-065-0110	BH508707FS	-	940 B	-
8709-065-0120	BH508712UC	-	1000 B	-
8709-065-0130	BH508715CT	-	1000 B	-
8709-065 0140	BH508717BR	-	510 B	-
** Batch 8709 069 **				
8709-069 0001BL	BLANK	10 J	75	60
8709 069 0030	BH49870008	-	300 B	-

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
- Not detected (detection limit of 50 ug/kg)  
NA - Not analyzed  
NS - Not spiked



TABLE 4-2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8709 069-0040	BH49870816	-	710 B	-
8709 069 0060	BH54871424		1600 B	
8709 069-0080	BH51870009		1700 B	
** Batch 8709 075 **				
8709-075 0001BL	BLANK	15 J	45 J	-
8709 075 0060	BH548738WT		29 B	
870J 075 0070	BH548740CT	-	22 B	
8709 075 0080	BH548742BR	15 JB	460 B	
8709 075 0090	BH5487042D	13 JB	280 B	-
8709 075-0100	BH54872334	14 JB	190 B	-
8709 075 0140	BH498720UC	6 JB	91 B	
8709-075 0150	BH498722CT	7 JB	90 B	
870J 075 0160	BH498724BR	7 JB	120 B	
8709 075 0160MS	BH498724BR MS	7 JB	140 B	
** Batch 8709-078 **				
8709 078 0001BL	BLANK 9/28	15 J	45 J	-
8709 078 0040	BH518712WT	6 JB	300 B	
8709 078 0050	BH518714CT	6 JB	420 B	-
8709 078-0060	BH518717BR	6 JB	72 B	-
8709 078-0110	BH52870010	6 JB	43 JB	
8709 078 0120	BH528712DH	6 JB	51 B	
8709 078-0130	BH528722CT	6 JB	80 B	-
8709 078 0140	BH528724BR	15 JB	94 B	
** Batch 8709-380 **				
8709 380 0160	BH4387300D	15 J	180 B	
** Batch 8710-016 **				
8710-016-0001BL	BLANK 10/11	-	40 J	-
8710-016 0040	BH598704UC	7 J	88 B	
8710 016 0050	BH598707CT	10 J	100 B	
8710-016 0060	BH598709BR	6 J	87 B	-
** Batch 8710-025 **				
8710 025-0001BL	BLANK 10/29	-	35 J	-

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
- Not detected (detection limit of 50 ug/kg)  
NA Not analyzed  
NS Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RfW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8710 025-0050	BH578704DH	10 J	79 B	-
8710 025 0060	BH578708DH	16 J	110 B	-
8710 025-0070	BH578710UC	10 J	85 B	-
8710 025 0080	BH578712CT	20 J	100 B	-
8710 025-0080MS	BH578712C1 MS	20 JNS	120 BNS	-
** Batch 8710 032 **				
8710-032-0001BL	BLANK 10/30	20 J	85	100
8710 032 0130	BH578714BR	21 JB	260 B	46 J
8710-032 0140	BH578716DH	36 B	200 B	-
8710-032 0150	BH578718DH	25 JB	220 B	-
8710 032 0160	BH578720DH	25 JB	210 B	62
8710 032 0170	BH578722DH	26 B	110 B	-
8710-032 0180	BH578724DH	6 JB	53 B	-
8710 032 0190	BH578726DH	6 JB	65 B	-
8710 032-0200	BH578728DH	-	38 JB	-
8710 032 0210	BH588700UC	25 JB	110 B	-
8710 032 0220	BH588702CT	22 JB	120 B	-
8710-032 0230	BH588704BR	19 JB	74 B	-
** Batch 8710 040 **				
8710 040 0001BL	BLANK 10/26	-	-	-
8710 040 0020	BH618707DH	-	-	-
** Batch 8710 051 **				
8710 051-0001BL	BH618709CT	13 J	-	-
8710 051-0030	BH618712BR	19 J	-	-
8710 051 0060			-	-
** Batch 8710 056 **				
8710 056-0001BL		-	-	-
8710-056 0030	BH638712DH	30	-	-
8710-056-0040	BH63870008	15 J	-	-
** Batch 8710-063 **				
8710 063-0001BL		-	-	-

Notes J Estimated concentration below detection limit  
B - Present in laboratory blank  
NA Not detected (detection limit of 50 ug/kg)  
NS Not analyzed  
NS Not spiked

TABLE 4 2  
VOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	Methylene Chloride	Acetone	2 Butanone
8710 063 0040	BH638718UC	16 J	64	
8710 063 0050	BH638722CT	13 J	-	
8710 063 0060	BH638724BR	18 J	60	
** Batch 8710 073 **				
8710 073 0001BL		5 J	-	
8710 073-0010	BH628714BR	23 JB	-	
8710 073 0060	BH628712CT	23 JB	-	
8710 073 0070	BH62870008	13 JB	-	
8710 073-0080	BH6287008D	12 JB	-	
8710 073-0100	BH628702DH	13 JB	-	

Notes	J	Estimated concentration below detection limit
B		Present in laboratory blank
-		Not detected (detection limit of 50 ug/kg)
NA		Not analyzed
NS		Not spiked

TABLE 4 3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	N Nitrosodiphenylamine	D1 n octylphthalate	D1 n-butylphthalate	Bis(2 ethylhexyl)phthalate
Bat 1 8706 042 **					
8706 012 0001BL	BLANK	-			7 J
8706 042 0010	BH29870010				840 B
8706 042 0020	BH298717WT				910 B
8706 042 0030	BH298716BR				18000 B
8706 042 0010	BH298713CT				470 B
8 06 042 0040MS	BH298713CTMS				1100 B
** Batch 8706 058 **					
8706 058 0001BL	BLANK	-			1 J
8706 058 0010	BH30871020				1200 B
8706 058 0020	BH308710MS	-			1500 B
8706 058 0030	BH308720WT				2100 B
8706 058 0040	BH308725BR				1800 B
Batch 8706 062					
8706 062 0010	BH25870009D		260 J		1900 B
8706 062 0020	BH258718BR		56 J		930 B
8706 062 0030	BH25870910		75 J	63 J	990 B
* Bat 1 8706 065 **					
8706 065 0020	BH258720MS				870 B
8706 065 0030	BH25870009				1100 B
8706 065 0010	BH258716CT				870 B
8 06 8 0050	BH258709WT				810 B
** Bat h 8707 042 **					
8707 042 0001BL	BLANK	3 J			
8707 042 0010	BH238708CT			2 J	3300
8707 042 0020	BH23870008				1600
8707 012 0030	BH238711BR				2700
** Bat 1 8707 043 **					
8707 013 0001BL	BLANK	3 J			
8707 043 0040	BH23870008D			2 J	2300

Notes J Est mated concentration below detection limit  
B Pre ent in laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not sp ked

TABLE 4 3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

R/W Batch ID	Field Sample Number	N-Nitrosodiphenylamine	D1 n-octylphthalate	D1 n butylphthalate	Bis(2 ethylhexyl)phthalate
8707 043 0040MS	BH23870008D MS				NS
8 07 043 0050	BH27870010				230 J
8707 043 0060	BH278710CT				340
8707 043 0070	BH278713BR				220 J
** Bat h 8707 045 **					
8707 045 0001BL	BLANK				4 J
8707 045 0010	BH248708BR				890
8707 045 0020	BH248705CT	36 J		65 J	1200
** Bat h 8707 046 **					
8707 046 0001BL	BLANK				4 J
8707 046 0010	BH228710WS			97 J	540
8707 046 0020	BH22871018				600
8707 046 0030	BH22870009	-		91 J	820
** Bat h 8707 047 **					
8707 047 0001BL	BLANK				4 J
8707 047 0010	BH22870009D	35 J			650
8707 047 0020	BH228720CT			36 J	540
8 07 047 0030	BH228722BR	89 J			1600
8707 047 0030MS	BH228722BR MS				NS
** Bat h 8707 059 **					
8707 0 0 0001BL	BLANK				
870 0010	BH288700WT			1 J	
8707 053 0020	BH28870104			58 J	1400
8 07 059 0020MS	BH28870104 MS	51 J		82 J	3400
** Bat h 8707 060 **					
8707 060 0010	BH288705WS			61 J	970
8707 060 0020	BH288706CT			42 J	1600
8707 060 0030	BH288709BR			59 J	2100
** Bat h 8707 061 **					
8707 061 0010	BH38870010			41 J	4600

Note J Estimated concentration below detection limit  
B Present n laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not spiked

TABLE 4 3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

idw Batch ID	Field Sample Number	N-Nitrosodiphenylamine	Di-n-octylphthalate	Di n butylphthalate	Bis(2 ethylhexyl)phthalate
8707 061 0020	BH388710WS			73 J	2500
8707 061 0030	BH388720BR			100 J	12000
** Bat h 8707 073 **					
8707 073 0010	BH378705WS		-		420
8707 073 0020	BH268706BR		160 J		800
** Batch 8707 079 **					
8707 079 0010	BH37871113		-		280 J
8707 079 0010MS	BH37871113 MS				
8707 079 0020	BH378725BR		-	41 J	420
8707 079 0030	BH378721CT				550
** Bat h 8707 082 **					
8707 082 0001BL	BLANK			13	5 J
8707 082 0010	BH368705WS				290 J
8707 082 0020	BH36870005		-	42 J	340
8707 082 0030	BH3687005D		-	46 J	330
8707 082 0040	BH368720CT			40 J	260 J
8707 082 0050	BH36870515		-	83 J	480
8707 082 0060	BH368723BR			38 J	360
** Batch 870 103 **					
8707 103 0010	BH35870012			92 J	500
8707 103 0020	BH35870012D		-		680
** Batch 8707 106 **					
8707 106 0001BL	BLANK				4 J
8707 106 0010	BH358715CT	2 J	-		360
8 07 106 0020	BH358718BR	-	-		320 J
8707 106 0020MS	BH358718BR MS	-	-		350 NS
8707 106 0030	BH35871215				220 J
** Batch 8707 110 **					
8707 110 0001BL	BLANK				3 J
8707 110 0010	BH348718CT	33 J		2 J	250 J

Note J Estimated concentration below detection limit  
B Present in laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
Not sp ked

TABLE 4-3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

R/W Bat h ID	Field Sample Number	N Nitrosodiphenylamine	Di n-octylphthalate	Di-n-butylphthalate	Bis(2 ethylhexyl)phthalate
8707 110 0020	BH348721BR			35 J	220 J
8707 110 0020MS	BH348721BR MS			43 JNS	310 JNS
8707 110 0030	BH348715WS	45 J		50 J	310 J
8707 110 0040	BH348708CL	47 J		42 J	430
8707 110 0050	BH34870008	42 J	-	-	450
8707 110 0060	BH34870815	43 J	-	-	250 J
8707 110 0070	BH3487815D	44 J			220 J
** Batch 8708 002 **					
8708 002 0010	BH338720WT	49 J		-	450
8708 002 0020	BH338716CT	37 J		-	160 J
8708 002 0030	BH338719BR	42 J		-	240 J
8708 002 0040	BH33870004	37 J		-	270 J
8708 002 0050	BH33870815	41 J		-	370
8708 002 0060	BH3387815D	40 J		-	530
** Batch 8708 010 **					
8708 010 0010	BH328716CT			-	270 J
8708 010 0020	BH328718BR			-	9 J
8708 010 0030	BH32870008			-	310 J
8708 010 0040	BH32870815			-	310 J
8708 010 0050	BH3287815D			-	260 J
** Batch 8708 012 **					
8708 012 0010	BH31870013	41 J			580
8708 012 0020	BH31870013D	37 J			490
8708 012 0020MS	BH31870013D MS	49 JNS			350 NS
8708 012 0030	BH318713CT				470
8708 012 0040	BH318716BR	40 J			430
** Batch 8708 030 **					
8708 030 0001BL	BLANK				
8708 030 0010	BH398700FS	51 J			310 J
8708 030 0020	BH398702DH	33 J			370
8708 030 0030	BH398704DH				280 J
8708 030 0040	BH398709FS				360
8708 030 0050	BH398712UC				240 J
8708 030 0060	BH398714CT				250 J

Note J Estimated concentration below detection limit  
B Present in laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not spiked

TABLE 4 3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	N Nitrosodiphenylamine	Di n octylphthalate	D n butylphthalate	Bis(2 ethylhexyl)phthalate
8708 070 0070	BH398717BR		-		250 J
8708 040 0080	BH398719DH				210 J
8708 030 0080MS	BH398719DH MS				270 JNS
8708 030 0090	BH398707DH			-	180 J
8708 030 0100	BH408704UC	-			260 J
8708 030 0110	BH408707CT	-		-	160 J
8708 030 0120	BH408709BR	-		-	200 J
* Batch 8708 041 **					
8708 041 0001BL	BLANK				
8708 041 0010	BH418712UC			59 J	42 J
8708 041 0020	BH418714CT				380
8708 041 0030	BH418717BR			-	150 J
8708 041 0040	BH41870012	-			190 J
8708 041 0050	BH4187012D	-			150 J
8708 041 0050	BH4187012D MS			-	160 J
					240 JNS
* Batch 8708 044 **					
8708 011 0001BL	BLANK				
8708 044 0010	BH428717WT	-		59 J	42 J
8708 041 0020	BH42870009			-	140 J
8708 044 0030	BH4287009D				220 J
					170 J
** Bat h 8708 047 **					
8708 047 0001BL	BLANK				
8708 047 0010	BH428727BR				200 J
8708 01 0020	BH428729DH			34 J	480
8708 047 0020MS	BH428729DH MS			34 JNS	720
8708 047 0030	BH428732FS				590 NS
8708 047 0040	BH428734FS	100 J		34 J	640
8708 047 0050	BH428737FS			-	410
8708 047 0060	BH428724DH			39 J	520
8708 047 0130	BH428722CT			170 J	520
					500
** Batch 8708 049 **					
8708 049 0001BL	BLANK				
8708 049 0010	BH428739FS			34 J	200 J
					610
* Batch 8708 053 **					

8708 053 0001BL Not detected (detection limit of 330 ug/kg)  
B Present in laboratory blank  
NA Not analyzed  
NS Not spiked



TABLE 4-3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

HPW Batch ID	F eld Sample Number	N-Nitrosodiphenylamine	Di n-octylphthalate	Di n-butylphthalate	Bis(2 ethylhexyl)phthalate
8708 053 0010	BH428745DH	-			160 J
8708 053 0010MS	BH428745DH MS	-			390 NS
** Batch 8709 002 **					
8709 002 0001BL	BLANK	33 J			190 J
8709 002 0010	BH45870009				880
8709 002 0020	BH45870917				770
8709 002 0020MS	BH45870917 MS	39 JNS			1200 NS
** Batch 8709 007 **					
8709 007 0001BL	BLANK				56 J
8709 007 0010	BH458717UC				180 J
8709 007 0020	BH458720CT				180 J
8709 007 0020MS	BH458720CT MS				200 JNS
8709 007 0030	BH458722BR				120 J
8709 007 0040	BH458725FS				190 J
8709 007 0050	BH458727DH				130 J
8709 007 0060	BH458730DH				150 J
** Batch 8709 011 **					
8709 011 0001BL	BLANK				56 J
8709 011 0010	BH458732FS				220 J
8709 011 0020	BH458735FS				140 J
Bat h 8709 018 **					
8709 018 0001BL	BLANK				73 J
8709 018 0010	BH46870009				250 J
8709 018 0020	BH46870919				210 J
** Bat h 8709 023 **					
8709 023 0001BL	BLANK				73 J
8709 023 0010	BH468726CT				230 J
8709 023-0020	BH468729BR				350
8709 023 0020MS	BH468729BR MS				410 NS
** Bat h 8709 027 **					
8709 027 0001BL	BLANK				73 J

Note J Est mated concentration below detection limit  
B Present in laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not spiked

TABLE 4 3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RTW Bat h ID	Field Sample Number	N Nitrosodiphenylamine	Di-n octylphthalate	Di-n-butylphthalate	Bis(2-ethylhexyl)phthalate
8709 027 0010	BH438700FS	39 J	-	-	420
8709 027 0020	BH438702FS	35 J	-	-	480
8709 027 0030	BH438704DH	-	-	-	450
8709 027 0040	BH438712DH	-	-	-	510
8709 027 0050	BH438714DH	-	-	-	360
8709 027 0060	BH438717DH	-	-	-	430
8709 027 0070	BH438709DH	-	-	49 J	630
** Batch 8709 034 **					
8709 034 0010	BH438722DH	-	-	43 JB	350 B
8709 031 0020	BH438725DC	-	-	38 JB	410 B
8709 034 0030	BH438727CT	-	-	-	310 JB
8709 034 0040	BH438730BR	37 JB	-	-	290 JB
8709 034 0040MS	BH438730BR MS	-	-	-	300 JNS
** Batch 8709 038 **					
8709 038 0001BL	BLANK	95 J	-	64 J	190 J
8709 038 0010	BH448704DH	40 JB	-	-	300 JB
8709 038 0020	BH448714DH	-	-	-	370 B
8709 038 0030	BH448719DH	38 JB	-	-	360 B
8709 038 0040	BH448722DH	36 JB	-	-	380 B
8709 038 0050	BH448724DH	-	-	-	340 B
8709 038 0060	BH448729WT	-	-	38 JB	430 B
8709 038 0070	BH448732BR	-	-	38 JB	920 B
8 09 018 0150	BH4387300D	-	-	34 JB	730 B
** Bat h 8709 0 2 **					
8709 052 0001BL	BLANK 9/18	140 J	-	44 J	330
8709 052 0010	BH478700FS	48 JB	-	52 JB	580 B
8 0 052 0030	BH478702FS	41 JB	-	48 JB	920 B
8709 052 0050	BH478704DH	38 JB	-	47 JB	760 B
8709 052 0070	BH478706DH	37 JB	-	39 JB	750 B
8709 052 0070MS	BH478706DH MS	-	-	44 JB	890 B
8709 052 0090	BH478708DH	-	-	-	630 B
8709 052 0110	BH478709DH	-	-	36 JB	790 B
8709 052 0130	BH478711DH	-	-	36 JB	980 B
8709 052 01 0	BH478713DH	-	-	-	1000 B
8709 052 0170	BH538700DH	36 JB	-	-	1200 B
8709 052 0190	BH538702DH	38 JB	-	33 JB	1300 B

Not s J Estimated concentration below detection limit  
B Pre ent n laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not sp ked

TABLE 4 3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	F eld Sample Number	N Nitrosodiphenylamine	D1 n-octylphthalate	D n-butylphthalate	Bis(2-ethylhexyl)phthalate
8709 052 0220	BH538706DH		-	44 JB	930 B
8709 052 0240	BH538708DH	-	-	42 JB	900 B
8709 052 0260	BH568717WT	-	-	50 JB	1100 B
8709 052 0280	BH568720CT		-	50 JB	880 B
8709 052 0300	BH568722BR	42 JB	-	47 JB	1000 B
** Batch 8709 058 **					
8709 058 0001BL	BLANK 9/18				
8709 058 0002BL	BLANK 9/21	140 J	-	44 J	330
8709 058 0010	BH478716FS	35 J	-	43 J	550
8709 058 0020	BH478720DH		-	58 JB	900 B
8709 058 0030	BH478721FS	-	-	48 JB	870 B
8709 058 0040	BH478722WT	36 JB	-	55 JB	890 B
8709 058 0090	BH538714DH	120 JB	-	260 JB	970 B
8709 058 0100	BH538716DH		-	87 JB	
8709 0 8 0110	BH538719WT		-	49 JB	720 B
8709 058 0120	BH538720CT		-	59 JB	700 B
8 0 0 8 0130	BH538722BR	-	-	61 JB	810 B
				58 JB	670 B
* Batch 8709 061 **					
8709 061 0001BL	BLANK 9/21				
8709 061 0010	BH478726CT	35 J		43 J	550
8 0 0 01 0020	BH4787026D			44 JB	810 B
8709 061 0030	BH478727BR			59 JB	960 B
8709 061 0070	BH548702WT		-	44 JB	1100 B
8709 061 0090	BH558702DH	250 JB	-	55 JB	1200 B
8709 061 0100	BH558710DH		-	43 JB	960 B
8709 061 0110	BH558712WT		-	45 JB	1200 B
8709 061 0120	BH55871424		-	54 JB	1200 B
8709 061 0130	BH558727UC		-	94 JB	990 B
8709 061 0110	BH558729CT		-	48 JB	1000 B
8709 061 0150	BH558732BR	160 JB	-		
8 09 061 0160	BH558732BRD	-	-	56 JB	860 B
8709 061 0160MS	BH558732BRD MS		-	49 JB	900 B
8 09 061 0170	BH558734DH		-	50 JBNS	1000 B
				80 JB	850 BNS
					890 B
* Bat h 8709 064 **					
8709 064 0001BL	BLANK 9/23				
8709 064 0010	BH548706DH	46 J	-	39 J	340
				90 JB	610 B

Note J Estimated concentration below detection limit  
B Present in laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not spiked

TABLE 4.3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

RFW Batch ID	Field Sample Number	N-Nitrosodiphenylamine	Di n-octylphthalate	Di n-butylphthalate	Bis(2 ethylhexyl) phthalate
8709 064 0020	BH548708DH	55 J		50 JB	330 B
8709 064 0030	BH548710DH	37 J		53 JB	640 B
8709 064 0040	BH548712DH			45 JB	590 B
8709 064 0040MS	BH548712DH MS	34 JNS		52 JENS	700 ENS
8709 064 0090	BH48870006			42 JB	670 B
** Bat h 8709 065 **					
8709 065 0001BL	BLANK 9/23			39 J	340
8709 065 0020	BH488713CT			42 JB	470 B
8709 065 0030	BH488715BR	-		35 JB	560 B
8709 065 0070	BH508707FS			49 JB	610 B
8709 065 0080	BH508712UC			36 JB	450 B
8709 065 0090	BH508715CT			55 JB	690 B
8709 065 0100	BH508717BR			35 JB	370 B
** Bat h 8709 069 **					
8709 069 0001BL	BLANK			39 J	340
8709 069 0010	BH49870008	48 J		50 JB	600 B
8709 069 0020	BH49870816	41 J		68 JB	1100 B
8709 069 0050	BH54871424	62 J		46 JB	360 B
8709 069 0070	BH51870009	52 J		120 JB	460 B
** Batcl 8709 075 **					
8709 075 0001BL	BLANK 9/28	52 J		330	240 J
8709 075 0010	BH548738WT	84 JB		36 JB	550 B
8709 075 0020	BH548740CT			55 JB	770 B
8709 075 0030	BH548742BR				500 B
8709 075 0040	BH5487042D			34 JB	650 B
8709 075 0050	BH54872334				680 B
8709 075-0110	BH498720UC				710 B
8709 075 0120	BH498722CT				720 B
8709 075 0130	BH498724BR				580 B
** Bat h 8709 078 **					
8709 078 0001BL	BLANK 9/28	52 J		330	240 J
8709 078 0010	BH518712WT			72 JB	510 B
8709 078 0020	BH518714CT			70 JB	620 B
8709 078 0030	BH518717BR			86 JB	720 B

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
NA Not analyzed  
NS Not sp ked

TABLE 4-3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

id W Bat h ID	Field Sample Number	N-Nitrosodiphenylamine	Di-n-octylphthalate	Di n butylphthalate	Bis(2-ethylhexyl)phthalate
8709 078 0030MS	BH518717BR MS	130 JBNS		51 JBNS	810 BNS
8709 078 0070	BH52870010	370 B		120 JB	630 B
8709 078 0080	BH528712DH	210 JB	-	67 JB	650 B
8709 078 0090	BH528722CT	140 JB	-	39 JB	680 B
8709-078 0100	BH528724BR	280 JB	-	84 JB	530 B
** Batch 8710 016 **					
8710 016 0001BL	BLANK 10/08	68 J	-	-	360
8710 016-0010	BH598704UC	66 JB	-	-	1300 B
8710-016 0020	BH598707CT	56 JB	-	-	1500 B
8710 016-0030	BH598709BR	-	-	-	680 B
8710 016-0030MS	BH598709BR MS	56 JBNS	-	-	1000 BNS
** Batch 8710 025 **					
8710 025 0001BL	BLANK 10/26	-	-	-	77 J
8710 025 0010	BH578704DH	-	-	-	250 JB
8710 025-0020	BH578708DH	160 J	-	-	480 B
8710 025 0030	BH578710UC	-	-	-	300 JB
8710 025-0040	BH578712CT	45 J	-	-	250 JB
** Batch 8710 032 **					
8710-032 0001BL	BLANK 10/26	-	-	-	77 J
8710 032 0010	BH578714BR	77 J	-	-	460 B
8710 032 0020	BH578716DH	36 J	-	-	590 B
8710 032-0030	BH578718DH	130 J	-	-	540 B
8710 03 0040	BH578720DH	38 J	-	-	510 B
8710 032 0050	BH578722DH	140 J	-	-	280 JB
8710 032 0060	BH578724DH	52 J	-	-	830 B
8710 032 0070	BH578726DH	120 J	-	-	1000 B
8710 032 0070MS	BH578726DH MS	37 JNS	-	-	290 JBNS
8710 032 0080	BH578728DH	77 J	-	-	150 JB
8710 032 0090	BH588700UC	97 J	-	-	130 JB
8710 032 0100	BH588702CT	84 J	-	60 J	85 JB
8 10 032 0110	BH588704HR	-	-	650	160 JB
8710 032 0120	BH578702BD	52 J	-	74 J	140 JB
** Batch 8710 040 **					
8710 040 0001BL	BLANK 10/26	-	-	-	77 J

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
N1 Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not spiked

TABLE 4-3  
SEMIVOLATILE ORGANICS IN SOILS  
POSSIBLY ATTRIBUTABLE TO LABORATORY CONTAMINATION  
(ug/kg)

HRW Bat t ID	Field Sample Number	N-Nitrosodiphenylamine	D1 n-octylphthalate	D1-n butylphthalate	Bis(2-ethylhexyl)phthalat
8710 040 0010	BH618707DH	-	-	280 J	120 JB

Notes J Estimated concentration below detection limit  
B Present in laboratory blank  
NA Not detected (detection limit of 330 ug/kg)  
NS Not analyzed  
NS Not spiked

detection limits and was present in one of the laboratory blanks N nitrosodiphenylamine di n octyl phthalate and di n butyl phthalate were generally present only at estimated concentrations below detection limits and bis(2 ethylhexyl)phthalate appeared in many of the samples generally at estimated concentrations below detection limits or within a factor of 2 of the detection limit (330 ug/kg) and was present in several blanks As mentioned the exceptions to those general rules are discussed subsequently under the SWMU subsections However in general it appears that the presence of these compounds in the samples represent laboratory artifact Methylene chloride acetone and 2 butanone are common volatile solvents used in the laboratory N nitrosodiphenylamine is a degradation product of the gas chromatograph column Phthalates are components of plasticizers whose presence in a sample or blank can be generally attributed to contact with plastic With the exception of acetone and bis(2 ethylhexyl)phthalate the presence of these compounds in the soils is not expected based on the waste management history Records indicate an unknown number of drums stored at the 903 drum storage site contained acetone and vacuum pump oil Bis(2 ethylhexyl)phthalate is a component of vacuum pump oil (Sax and Lewis 1987)

Unlike HSL organics metals and radionuclide concentrations must be evaluated relative to background soil concentrations Background for soil samples was based on 1986 sampling and analysis done in the west buffer zone (an area not affected by any waste disposal activities) Table 4 4 presents the background soil data A one time sampling of a plot in the west buffer zone to a depth of one foot cannot be considered a complete characterization of background alluvial and bedrock materials however it suffices as a basis for assessing potential contamination

**TABLE 4 4**  
**CONCENTRATIONS OF METALS AND RADIONUCLIDES**  
**IN BACKGROUND SOIL**

Metals		Concentration PPM (mg/kg)	
Al		6540	9140
Sb		38 U	41 U *
As		61 U	10 U
Ba		122 U	137 U
Be		30 U	34 U
Ca		1020	1960
Cd		30 U	34 U
Cr (Total)		56	13
Co		12 U	25
Cu		66	11
Fe		9080	12 400
Pb		15	48
Mg		883	1490
Mn		196	337
Hg		01 U	
Ni		13 U	20
K		951	1860
Se		31 U	34 U
Ag		31 U	34 U
Na		63 U	217
Tl		63 U	68 U
Sn		25 U	27 U
V		30 U	38
Zn		20	50
Radionuclides		Concentration (pCi/gm)	
Pu		01(10)	10(20) **
Am		02(03)	28(16)
U233+234		66(16)	14(20)
U238		62(17)	92(18)
Tritium		70(220)	280(270) ***

\* U indicates values less than detection limits

\*\* Parentheses indicate counting error

\*\*\* Tritium is in units of pCi/l of soil water



Radionuclides are analyzed by counting sub atomic particle emissions which is a random function. Since radioactive disintegration is a statistical process and therefore has a probability distribution results are reported as a measured value with an associated two standard deviation propagated error term indicated in parentheses immediately following the measured value. In many cases a determination that two radionuclide concentrations are different from each other requires a statistical analysis incorporating the error term. A statistical analysis will be performed prior to preparation of the final RI report. However even without performing a statistical analysis radionuclide concentrations where the error term is larger than the measured value can be considered not statistically different from background because of the significant overlap of the probability distributions. Also if the measured value for a radionuclide falls within the background measured value range it is also not considered to be above background levels regardless of the error term. This is the basis for stating in this report that a radionuclide concentration is not above background levels. Similarly if the measured value minus the error term for a sample is greater than the measured value plus the error term for the upper limit of the background range it can be considered to be statistically different from background. This leaves a range of measured values and error terms between these extremes where without a statistical analysis it cannot be definitely stated whether the radionuclide concentration in the sample is different from background. As discussed below uranium levels in some soil samples from the 903 Pad Mound and East Trenches are a case in point.

Uranium concentrations in soil samples from the 903 Pad Mound and East Trenches Areas generally met the above criteria for being within background levels. Table 4.5 shows those samples where uranium concentrations may be above

**TABLE 4 5**  
**URANIUM CONCENTRATIONS ABOVE**  
**ESTIMATED BACKGROUND LEVELS**

<u>SAMPLE NO.</u>	<u>CONCENTRATION (pCi/g)</u>	
	<u>U 233+234</u>	<u>U 238</u>
BH25870009		1 1(0 3)
BH25870009D		1 5(0 3)
BH258718BR		1 4(0 3)
BH258720WS		1 4(0 3)
BH26870003		1 0(0 2)
BH268703CT		1 0(0 2)
BH288700WT		1 4(0 3)
BH288706CT	1 5(0 3)	1 4(0 3)
BH288709BR	2 8(0 5)	1 8(0 4)**
BH338716CT	1 5(0 2)	1 4(0 2)**
BH338720WT		1 1(0 2)
BH36870005		1 7(0 3)**
BH3687005D		1 2(0 3)
BH368720CT	1 6(0 4)	2 2(0 4)**
BH368723BR		0 94(0 35)
BH378725BR		1 6(0 4)**
BH45870917		1 5(0 2)**

\* Background upper limits U 233+234 [1 4(0 2)] U 238 [0 92(0 18)]

\*\* Likely to be statistically different from background

background levels Only six of the samples had uranium concentrations likely above background levels but even in these cases the concentrations were generally within a factor of two of the upper background concentrations Considering 1) background concentrations for uranium are not well characterized 2) most soil samples had uranium concentrations within the estimated background limits and 3) only a few random samples had uranium concentrations that may be above the estimated background limits but are still within a factor of two it is concluded that uranium contamination of the soils at the 903 Pad Mound and East Trenches does not exist and the observed uranium concentrations likely represent natural variation of uranium in the soils Such is not the case for plutonium and americium where in some samples their concentrations are significantly elevated above background These observations are discussed in the SWMU subsections

In general metal concentrations in soil samples from the 903 Pad Mound and East Trenches Areas were within the background levels shown in Table 4 4 Metals of interest from a public health perspective and their respective concentrations that exceeded the upper limit of the background range are shown in Table 4 6 (Metals analyzed for but excluded from this analysis are aluminum iron and manganese) Inspection of the data shows that generally these metal concentrations are within a factor of two of background The following samples had metal concentrations in excess of three times background

TABLE 4 6

## METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\*

Sample No	As (10U)	Ba (137U)	Cd (3.4U)	Cr (13)	Cu (11)	Hg (10)	NI (20)	SR (3.4U)	V (38)	Zn (50)
BH22870009						18		74		
BH22870009D								35		
BH22871018	13 6				12					
BH228720CT				13						
BH2287228R								41		
BH23870008		212		18	19	19		14J	40	
BH23870008D		194	4	22	18		22	26	41	
BH238708CT			3 8		12	10				
BH2387118R					11	21				
BH24870002	11							5 3		
BH2487088R					15			16J		63
BH248710WS								100		70
BH25870009			4 6	20						
BH25870009D	15 7	1899	5 2	21 1			28 2	29	42 4	54
BH258709WT			3 5	20						
BH25870910			4 4	19 1	13 5		36 1	16 7	42 4	
BH258716CT				13		12		30		
BH2587188R			3 8					39 1		
BH258720WS	20			16		12		54		60
BH26870003	17 8	216		15 6	19 8			87 6	50 5	
BH268703CT	10			13 2	18 6			100		
BH2687068R								34		
BH27870010			5 4	19				12 2J	39	
BH278710CT				14	14					
BH2787138R				17	14			29		

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
Parentheses indicate upper limit of background concentration

TABLE 4 6

METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\*  
(Continued)

Sample No	As (10U)	Ba (137U)	Cd (3 4U)	Cr (13)	Cu (11)	Hg (10)	Ni (20)	Sr (3 4U)	V (38)	Zn (50)
BH288700WT								17J		
BH288705WS		150	4 7					16J	49	
BH288706CT			3 7							
BH288709BR						12		44		
BH29870010						11		17J		
BH298713CT						0 2		12J		
BH298716BR						0 9				
BH298717WT						0 5		38	49	
BH31870013	12							26		
BH31870013D								34		
BH318713CT	14							25		
BH318716BR								29		
BH32870008						13		30		
BH32870815						34		19J		
BH328718BR						12	23	16J		
BH3287815D								13J		
BH33870004	11		3 7					24		
BH33870815	15							23		
BH338716CT								16J		
BH338719BR								23		
BH338720WT	15							35	43	
BH3387815D								12J	46	
BH34870008								58		
BH348708CL								<20		
BH348715WS	12				25					
BH348718CT	11								108	
BH348721BR								20		
BH3487815D	13									

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
Parentheses indicate upper limit of background concentration

TABLE 4 6

**METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\***  
(Continued)

Sample No	As (10U)	Ba (137U)	Cd (3 4U)	Cr (13)	Cu (11)	Hg (10)	Mn (20)	SR (3 4U)	V (38)	Zn (50)
BH35870012	13							43		
BH35870012D	10							50		
BH35871215								36		
BH358715CT				14	16		21	36	49	
BH358718BR	14	142		15	18			40	40	64
BH36870005								120		
BH3687005D		140						20		
BH368705WS								87		
BH36870515				14				19J		
BH368720CT				18				16J		
BH368723BR					17			46		70
BH37870005								59		
BH3787005D								184		
BH378705WS								51		
BH37871113								32		
BH378721CT								30		
BH378725BR	20	390					22	38		66
BH38870010								36		
BH388720BR								56		
BH398700FS	37		5 7					19J		
BH398702DH	26		6 2					23		
BH398704DH								60		
BH398707DH	12			16	13			22		
BH398709FS	12									
BH398712UC	17									
BH398714CT	25	413			13			25	59	
BH398717BR								22		
BH398719DH			4 0					20		

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
Parentheses indicate upper limit of background concentration

TABLE 4 6

METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\*  
(Continued)

Sample No	As (10U)	Ba (137U)	Cd (3.4U)	Cr (13)	Cu (11)	Hg (.10)	Ni (20)	SR (3 4U)	V (38)	Zn (50)
BH408704UC	15							28		
BH408707CT								21		
BH408709BR								15J		
BH41870012	12			32				26		
BH4187012D	14							47		
BH418712UC	12							18J		
BH418714CT	13							26		
BH418717BR	13							28		
BH42870009	15							54		
BH4287009D	14							46		
BH428717WT	18							<20		
BH428722CT	10							14J		
BH428724DH								19J		
BH428727BR								27		
BH428729DH	174			13	15			24		
BH428732FS	397							17J		
BH428734FS								<20		
BH428737FS								<20		
BH428739FS								<20		
BH428745DH								<20		
BH438700FS								<20		
BH438702FS								53		
BH438704DH								27		
BH438709DH								<20	22	
BH438712DH								<20		
BH438714DH				58				<20		
BH438717DH								<20		
BH438722DH				34				<20		
BH438725UC				24				<20		
BH438727CT		170			13			<20	41	
BH438730BR			3 6		17			32		60
BH4387300D					14			39		

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
Parentheses indicate upper limit of background concentration

TABLE 4 6

**METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\***  
(Continued)

Sample No	As (10U)	Ba (137U)	Cd (3 4U)	Cr (13)	Cu (11)	Hg (10)	Ni (20)	SR (3 4U)	V (38)	Zn (50)
BH448704DH								<20		
BH448714DH								<20		
BH448719DH								<20		
BH448722DH								<20		
BH448724DH								<20		
BH448729WT								<20		
BH448732BR					14			24		
BH45870009								48		
BH45870917	11							15J		
BH458717UC	14		4 1					18J		
BH458720CT								15J		
BH458722BR								27		
BH458725FS			3 6					32		
BH458727DH	13	226	6 1		17		23	41	60	60
BH458730DH	14	139	4 5		13			26		
BH468726CT		151 4	6 2					26	51	124
BH468729BR								15J		
BH478700FS								32		
BH478702FS	10 5							62		
BH4787026D							22 3	<20		
BH478704DH	11 7							79		
BH478706DH				19				55		
BH478708DH				18				28		
BH478709DH				15				20		
BH478711DH								14J		
BH478713DH								<20		
BH478716FS								<20		

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
Parentheses indicate upper limit of background concentration



TABLE 4 6

**METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\***  
(Continued)

Sample No	As (10U)	Ba (137U)	Cd (3 4U)	Cr (13)	Cu (11)	Hg (10)	Ni (20)	SR (3 4U)	V (38)	Zn (50)
BH478720DH				16				<20		
BH478721FS				18				<20		
BH478722WT								<20		
BH478726CT							26 8	33 7		
BH478727BR							29 8	44 4		52
BH48870006	22 8							76 8		
BH488713CT	12 3							29 1		
BH488715BR	10 1					12		29 6		
BH49870008			15 2			30	25 5	<20		
BH49870816				18 2				<20		
BH498720UC								<20		
BH498722CT						13				
BH498724BR										77 6
BH508707FS	25 7					12		27 2		
BH508712UC	11 4				13 1	12		<20		
BH508715CT	10 8				11 1	22		28 7		
BH508717BR	16 2					29		<20		
BH51870009				20 6				27		
BH518712WT				13 3		14		<20		
BH518714CT						17		<20		
BH518717BR						12		<20		
BH52870010						15		170		
BH528712DH						23		<20		
BH528722CT								<20		
BH528724BR						12		24 9		58 8

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
Parentheses indicate upper limit of background concentration

TABLE 4 6

METAL CONCENTRATIONS IN SOILS ABOVE ESTIMATED BACKGROUND LEVELS\*  
(Continued)

Sample No	As (10U)	Ba (137U)	Cd (3.4U)	Cr (13)	Cu (11)	Hg (10)	Ni (20)	SR (3.4U)	V (38)	Zn (50)
BH538700DH		140						59		
BH538714DH								<20		
BH538716DH								<20		
BH538719WT								<20		
BH538720CT								21 7		
BH538722BR								<20		
BH548702WT		154						196		
BH5487042D								<20		
BH548706DH	29 6							45 6		
BH548708DH	10 7							39 2		
BH548710DH	12 5							<20		
BH548712DH	14 6							<20		
BH54872334								<20		
BH548738WT								<20		
BH548740CT								<20		
BH548742BR								<20		
BH558702DH	12 7							72 7		
BH558710DH								<20		
BH558712WT								<20		
BH55871424	12 8		3 8	14				22 8		
BH558727UC								<20		
BH558729CT								<20		
BH558732BR								<20		
BH558732BRD								<20		
BH558734DH								<20		
BH568702DH								163		
BH568704FS				23				56		
BH568709DH				14				16J		
BH568712DH				18	12			<20		

All concentrations (mg/kg) Antimony beryllium selenium  
thallium and tin concentrations never exceeded background  
parentheses indicate upper limit of background concentration

<u>Metal</u>	<u>Background Concentration (mg/kg)</u>	<u>Sample Concentration (mg/kg)</u>	<u>Sample No.</u>
Arsenic	10U*	37	BH398700FS
Barium	137U	1899	BH2587009D
Cadmium	3.4U	15.2	BH49870008
Chromium	13	58	BH438714DH
Mercury	0.1U	0.34	BH32870815

\* U indicates metal not detected at detection limit shown e.g. 10 mg/kg is the reported detection limit for arsenic

With the exception of barium at 1899 mg/kg the above metal concentrations only slightly exceeded three times the upper limit of the background levels. The reason for the high barium concentration is not known but little significance can be placed on this isolated occurrence. Because background metal concentrations are not well characterized and most metal concentrations in the soil samples are at or within a factor of two of background levels it is concluded that metal contamination of the soils of the 903 Pad Mound and East Trenches does not exist and the observed metal concentrations likely represent natural variations of metals in the soils.

#### 4.1 903 PAD AREA

As discussed in Section 2 the 903 Pad Area was used mainly for disposal of flattened depleted uranium and plutonium contaminated drums. There are five solid waste management units (SWMUs) located within the 903 Pad Area. Presented below are the waste characterizations of each of these SWMUs. Soils of the gas detoxification site (SWMU 183) were not investigated as it is a RCRA regulated unit and site investigations will be performed in accordance with the Part 265 Closure Plan. The reader is directed to the introduction for a description of the waste management practices at each SWMU. For the 903 drum storage site and 903 lip site

the discussion is repeated here because of its particular significance in evaluating the data collected for these sites

4 1 1 Solid Waste Management Units 112 903 Drum Storage Site and 155 903 Lip Site

These SWMUs are located south of Central Avenue just inside the East Guard Gate. The 903 drum storage site was used from 1958 to 1967 to store drums containing radioactively contaminated used machine cutting oil. Up to 5 240 drums were stored at this site during its use.

Approximately 3 570 drums contained oils and solvents contaminated with plutonium and the balance were contaminated with uranium. Most of the drums contained lathe coolant consisting of mineral oil and  $\text{CCl}_4$  in varying proportions. However, an unknown number of drums contained hydraulic oils, vacuum pump oils, TCE, PCE, silicone oils, and acetone (Rockwell International 1986a). Ethanolamine was also added to new drums after 1959 to reduce the drum corrosion rate.

Removal of the drums from the storage area began in 1967. The older drums and those containing plutonium were removed first. The last known drum of contaminated liquid was removed in June 1968.

After the drums were removed, efforts were undertaken to scrape and move the plutonium contaminated soil into a relatively small area, cover it with fill material, and top it with an asphalt containment cover (903 Pad). This remedial action was completed in November 1969. An estimated 5 000 gallons of liquid leaked into the soil during use of the drum storage site. The liquid was estimated to contain 86 grams of plutonium (Rockwell International 1986a).

During drum removal and cleanup activities associated with the 903 drum storage site winds redistributed plutonium beyond the pad to the south and east. Approximately 10 Curie (Ci) of plutonium was deposited between the pad and the perimeter security fence. The most contaminated area is immediately adjacent to the pad to the south and southeast. Partial cleanup of this area referred to as the 903 lip site occurred in 1978 when about 4.7 million pounds (lbs) of contaminated soil containing 0.56 Ci plutonium were removed, packaged and shipped off site as radioactive waste (Rockwell International 1986a). Soil was removed from the area until contamination levels were below the detection limits (250 dpm) of the radiometric survey instrument (FIDLER). This implies plutonium concentrations as high as  $10 \text{ ug/m}^2$  [60 picoCuries per gram (pCi/g) assuming a 1 cm depth and a soil density of  $1 \text{ g/cm}^3$ ] may still remain in the surface soil. However, these surface soils at the excavated area were backfilled to grade with clean topsoil to a depth of 15 to 20 cm and reseeded with native grasses (Barker and others 1982).

Several boreholes were drilled to characterize the soils in the vicinity of the 903 drum storage (pad) and lip sites. Borehole BH29 87 was drilled approximately 200 feet west of the pad area. Boreholes BH22 87 and BH23 87 were placed in the 903 lip site approximately 50 feet south of the southwest and southeast quarters of the 903 pad, respectively. Borehole BH24 87 was drilled about 200 feet southeast of the southeast corner of the pad and borehole BH30 87 was located approximately 200 feet east of the pad. Both boreholes BH24 87 and BH30 87 are in the lip site. Based on the historical waste management practices at these SWMUs, plutonium,  $\text{CCl}_4$ , TCE, PCE, and possibly acetone and bis(2 ethylhexyl)phthalate are the contaminants expected at this location.

Soil gas sampling indicated the presence of the volatile organic compounds TCE PCE and  $\text{CCl}_4$  in the vicinity of the 903 drum storage and lip sites PCE was present at high levels (>10 000 counts) while TCE and  $\text{CCl}_4$  ranged from low levels (<1 000 counts) south of the 903 drum storage site (lip site) to moderate levels (1 000 10 000 counts) to the east of the 903 drum storage site (northeastern portion of the lip site) at moderate to elevated levels No other organic compounds were detected in the soil gas samples

As discussed in the introduction to Section 4 analytical results from soil sampling of these boreholes indicate the presence of HSL organics but it appears that these organics may have originated from the laboratory However it is noted that of the lab contaminant organics bis(2 ethylhexyl)phthalate was significantly elevated in some samples relative to that seen in the blanks It ranged from 1200 3300 micrograms per kilogram (ug/kg) in boreholes BH30 87 (all samples below 10 feet) BH23 87 (all samples) and BH24 87 (2 and 10 foot samples) It occurred at 8100 ug/kg in BH30 87 (10 foot sample) and 18 000 ug/kg in BH29 87 (16 foot bedrock sample) Also of note di n butyl phthalate was present at 3 400 ug/kg in BH30 87 (10 foot sample) The occurrence of bis(2 ethylhexyl)phthalate at high concentrations at depth may indicate a release of this organic to ground water at the 903 drum storage site Bis(2 ethylhexyl)phthalate is a component of vacuum pump oil a waste stored at the 903 drum storage site

Of the HSL organics that represent industrial solvents toluene occurred only in the 0 2 foot sample from BH24 87 (1 7J ug/kg) however it was also detected in the laboratory blank from the same sample at 2 ug/kg Trichloroethane (1 1 1 TCA) was detected in the 0 10 foot sample (BH29 87) at 5J ug/kg These sporadic and low concentrations of solvents indicate solvent contamination of the soils in this area is

not extensive and possibly non existent The TCE PCE and  $\text{CCl}_4$  detected in the soil gas is present in the ground water as indicated by data for wells 1 71 and 2 71

Plutonium and americium were the radionuclides found above background levels in the vicinity of the 903 drum storage site Plutonium as expected considering the waste storage history at the 903 drum storage site and windblown dispersion to the lip areas was detected at elevated concentrations in all the surficial samples and possibly in some of the deeper intervals The concentrations of plutonium detected were BH22 87 [0 9 foot duplicate at 63(1 4) pCi/g and the 10 foot sample at 0 12(0 09) pCi/g] BH23 87 [0 8 foot at 1 1(0 2) pCi/g and 0 8 foot duplicate at 0 85(0 17) pCi/g] BH24 87 [0 2 foot at 96(4) pCi/g] BH29 87 [0 10 foot at 0 59(0 16) pCi/g] and BH30 87 [0 10 foot at 180(10) pCi/g and 10 foot at 0 33(0 16) pCi/g] The plutonium concentrations from soil composites that include the ground surface are significantly higher than the upper background level of plutonium 0 10(0 2) pCi/g The plutonium concentration from deeper intervals may not be statistically different from background The results indicate that plutonium contamination is indeed present in the vicinity of the 903 drum storage and lip sites but is probably confined to just beneath the surface Plutonium contamination also appears highest east of the 903 drum storage site Americium was detected at the concentrations of 0 93(0 26) pCi/g from BH22 87 (0 9 foot duplicate sample) 11(2) pCi/g from BH24 87 (0 2 foot sample) and 22(6) pCi/g in the 0 10 foot sample from BH30 87 Again the concentrations detected for this radionuclide are well above the upper background level of 0 28(0 16) pCi/g Like plutonium americium is only truly elevated in soil samples where the compositing interval includes the surface This indicates that americium contamination is also present in the vicinity of the 903 drum storage site

and is confined to just beneath the surface. As with plutonium the highest americium concentrations are east of the 903 drum storage site.

The only other radionuclides worthy of note are cesium 137 and strontium 90. Cesium was at the concentrations of 12(09) pCi/g from BH22 87 in the 22 foot bedrock sample and 16(08) pCi/g from BH29 87 in the 0 10 foot sample. It was otherwise not detected. The significance of any of the cesium concentrations is unknown because background data are unavailable for this radionuclide. Background data are also unavailable for strontium. Strontium was detected only in the 0 8 foot sample of BH23 87 at 11(05) pCi/g. However this concentration is typical of strontium levels in other samples from boreholes at the Mound and East Trenches Areas.

After a comprehensive review of the analytical results obtained from the soil boring program it appears that the 903 Pad Area is contaminated with plutonium, americium and possibly phthalates. The plutonium and americium contamination which appears to be confined to the surface is not surprising considering the waste storage practices that took place at the 903 drum storage site. Soil contamination studies conducted by Rockwell (Rockwell International 1987a) have shown elevated plutonium concentrations downwind (to the southeast) of the 903 drum storage site. The plutonium concentrations found in surficial soils at the 903 drum storage site support the conclusion that the 903 drum storage site was the source of this contamination. Although phthalates were present in the blanks in many instances they occurred at significantly higher concentrations in the soil samples at depth. This suggests that phthalate is a contaminant of the soils at the 903 drum storage site and may provide a source for release to ground water but a definite conclusion cannot be drawn.



#### 4 1 2 Solid Waste Management Unit 109 Trench T 2

Trench T 2 is located south of the 903 drum storage site. The orientation of this SWMU on Plate 4 1 is slightly modified from that shown on Figure 2 3 based on field reconnaissance review of historical aerial photographs and geophysical survey results. Drum lids are visible at the surface north of BH25 87 and buried metal (presumably flattened drums) was detected by the metal detection survey in the same area. The area containing buried metal appears to be the center of the trench based on historical air photos.

Based on the documented disposal of sewage sludge and flattened drums contaminated with plutonium and uranium, the most likely contaminants to be expected in the vicinity of the Trench T 2 area would be solvents, chrome, silver, plutonium and uranium. Three boreholes were drilled to characterize the soils in the vicinity of Trench T 2. Borehole BH25 87 was placed adjacent to the center corner of the trench. Boreholes BH26 87 and BH27 87 were drilled just south and east of the trench, respectively.

Soil gas results indicated moderate to high levels of PCE and TCE in the general vicinity of Trench T 2. In addition, an isolated occurrence of  $\text{CCl}_4$  at a low level was also found near the southeast end of the trench. Other volatiles were not detected in the soil gas near Trench T 2.

Analytical results from the samples collected from these boreholes indicate extensive organic contamination of the soils in the vicinity of BH25 87 (south of the trench). TCE appeared in all the samples collected from borehole BH25 87 ranging from 51 to 16 000 ug/kg. The highest concentration of 16 000 ug/kg was detected in

the bedrock sample 111 TCA was detected in the 18 foot and 20 foot bedrock samples taken from BH25 87 at the concentrations of 75J and 180J respectively Ethylbenzene and xylene were detected in the 0 9 foot 16 foot contact and 18 foot bedrock samples from borehole BH25 87 The concentrations of these compounds ranged from 11J to 780 ug/kg and 60 to 3 300 ug/kg respectively Toluene was also detected in the 0 9 foot sample (6J ug/kg) 9 10 foot sample (8J ug/kg) 16 foot contact sample (640 ug/kg) 18 foot bedrock sample (330J ug/kg) and 20 foot bedrock sample (300 ug/kg) from the same borehole PCE concentrations were also high in the bedrock ranging from 2100 to 10 000 ug/kg As discussed in the introduction to Section 4 other organics detected in the samples may not represent contamination because of their occurrence in laboratory blanks However some of these possible lab contaminants appeared at significantly elevated concentrations in the samples relative to that observed in the blanks For example acetone was detected at 1 100 ug/kg in both the 16 foot contact and 20 foot bedrock samples from borehole BH25 87 and never exceeded 90 ug/kg in the blanks Bis(2 ethylhexyl)phthalate was detected at 4 200 ug/kg in the 3 foot contact sample from BH26 87 and was detected at 1 100 and 1 900 ug/kg in the 0 9 foot composite sample and duplicate respectively from BH25 87 Bis(2 ethylhexyl)phthalate also occurred in two laboratory blanks at the concentrations of 2J and 31 ug/kg Because the concentrations of acetone and bis(2 ethylhexyl)phthalate in these cited samples are significantly greater than that found in the blanks their presence in the samples cannot be conclusively attributed to laboratory artifact Also both compounds were known to have been stored at the 903 drum storage site As the highest concentrations of these compounds occur in soils at depth the 903 drum storage site may be a source for releases of these compounds to ground water

Plutonium and americium were detected above background in the soil samples collected from these boreholes. Plutonium was detected at elevated concentrations in all soil composites that include the ground surface as follows: BH25 87 [3.2(0.4) pCi/g 0.9 foot duplicate sample], BH26 87 [83(2) pCi/g 0.3 foot sample] and BH27 87 [3.8(0.4) pCi/g (0.10 foot sample)]. Americium was detected in the 0.3 foot [12(1) pCi/g] and 0.10 foot [0.44(0.5) pCi/g] samples from BH26 87 and BH27 87 respectively. These concentrations of plutonium and americium are significantly above the upper background levels of 0.10(0.20) pCi/g and 0.28(0.16) pCi/g for plutonium and americium respectively. Cesium 137 appeared in the 0.9 foot duplicate sample [1.4(0.8) ug/kg] and 2 foot sample [3.1(0.7) ug/kg] from BH25 87. Strontium 90 was always less than 1.1 pCi/g. The significance of the cesium and strontium concentrations is unknown because these background concentrations have not been characterized.

As expected, the data indicate that soils in the vicinity of Trench T 2 are contaminated with plutonium, americium, solvents, and possibly acetone and bis(2-ethylhexyl)phthalate. Plutonium and americium contamination is particularly high in composite soil samples that include the ground surface, and solvent contamination appears highest south of Trench T 2 (BH25 87) in the bedrock. It is postulated that the radionuclide contamination originated from the 903 drum storage site via wind dissemination, and the solvent contamination is due to a release from Trench T 2 as solvents were not present in the soils from boreholes upgradient of BH25 87. Alluvial ground water to the south of Trench T 2 (well 2.71) also has elevated levels of these solvents. The phthalate contamination may have originated from the 903 drum storage as this compound occurs at elevated concentrations in soils from borehole BH23 87 upgradient of this location. The acetone present in the soils may be due to a

release from Trench T 2 because acetone was not significantly elevated relative to the laboratory blanks in soils upgradient of Trench T 2

#### 4 1 3 Solid Waste Management Unit 140 Reactive Metal Destruction Site

The reactive metal destruction site is located southeast of the 903 pad drum storage site and east of Trench T 2. The orientation of this SWMU was also revised slightly from that shown on Figure 2 3 based on field reconnaissance and a review of aerial photographs. The western portion of the site was roughly defined in the field by fence posts. Presumably a fence surrounded the site at one time. The eastern portion of the site was extended farther east than shown on Figure 2 3 after reviewing historical air photos.

The most likely contamination to be expected in the vicinity of the reactive metal destruction site would be lithium and solvents. Several boreholes were drilled to determine the exact nature of contamination present in the vicinity of this area. Borehole BH27 87 was drilled in the western portion of the site and BH26 87 was placed adjacent to the southwest corner of the site. Borehole BH24 87 was drilled adjacent to the northeastern corner of the destruction area. Data from these boreholes were discussed in the previous sections. BH28 87 was located approximately 50 feet southeast of BH24 87 and is discussed here.

Soil gas sampling and analysis indicated the presence of TCE and PCE at moderate to high levels in the general vicinity of the site. In addition carbon tetrachloride was detected at moderate levels adjacent to the northeastern corner of the site. No other organic compounds were detected in the soil gas samples.

As with Trench T 2 soil samples the data indicate definite solvent contamination of the soils and possible contamination with phthalates. The solvent contamination appears confined to the soils in the vicinity of BH28 87. Trans 1 2 dichloroethylene (t 1 2 DCE), chloroform ( $\text{CHCl}_3$ ), TCE, PCE,  $\text{CCl}_4$ , and cis 1 3 dichloropropene were detected only in the soil samples from BH28 87 below the water table. T 1 2 DCE was at estimated levels of 8J and 10J ug/kg, and chloroform was detected at estimated levels of 8J and 17J ug/kg.  $\text{CCl}_4$  was detected in three samples at the concentrations of 29, 50, and 100 ug/kg. TCE appeared at estimated levels of 5J, 6J, and 15J ug/kg. PCE was detected at concentrations of 14J, 84, and 210 ug/kg. Cis 1 3 dichloropropene was detected only in the bedrock sample and was at an estimated level of 6J ug/kg. None of these organics were detected in the laboratory blanks.

Bis(2 ethylhexyl)phthalate was detected in a range from 970 to 3 400 ug/kg in all the soil samples from BH28 87. This compound was not present in the laboratory blank for this batch of samples, and these concentrations are significantly elevated relative to concentrations in other blanks. Therefore, it is probable that bis(2 ethylhexyl)phthalate is a contaminant of the soils at this borehole.

Plutonium was detected above background in the surface and 9 foot bedrock samples from BH28 87. Plutonium was 2 0(0 3) pCi/g in the 0 9 foot composite sample and 0 82(0 32) pCi/g in the 9 foot bedrock sample. Cesium 137 was found at 0 3(0 17) pCi/g (0 9 foot sample) and 1 8(1 7) pCi/g (5 foot sample) in BH28 87, and strontium 90 was always less than 1 pCi/g. Again, the significance of the cesium and strontium concentrations is unknown as background concentrations have not been characterized.

It is concluded that solvent and radionuclide contamination does exist in the vicinity of the metal destruction site. The radionuclide contamination generally appears to be confined to the surface. BH28 87 is the only area where radionuclides were found at deeper intervals. It is likely that radionuclide contamination had arisen from windblown contamination from the 903 drum storage site. Solvent contamination appears to be confined to bedrock material in the vicinity of BH28 87 and may represent a local release because solvents were not detected in upgradient soils from borehole BH24 87. There is also solvent contamination of alluvial ground water in this vicinity at well 1 71. On the contrary bis(2 ethylhexyl)phthalate is elevated in soils at BH24 87 suggesting the 903 drum storage site as the source of this contaminant.

#### 4.2 MOUND AREA

The Mound Area is composed of 4 SWMUs

- o SWMU 108
- o SWMU 113
- o SWMU 153
- o SWMU 154

Presented below are the waste characterizations of these units

##### 4.2.1 Solid Waste Management Units 108 Trench T 1, 153 Oil Burn Pit No. 2

Based on the waste management practices at the SWMUs it is expected that plutonium, uranium, and solvents would be the most likely contaminants present in this area. Four boreholes were drilled in the general vicinity of these SWMUs. Borehole BH33 87 was drilled to the west of SWMU 153 and BH34 87 was drilled at the southwest corner of this SWMU. Borehole 36 87 was located just adjacent to the

northeast corner of SWMU 108 Borehole 35 87 was placed just south of SWMU 108 approximately 200 feet southwest of Borehole 36 87

Soil gas sampling found high levels of PCE present in the soil gas in the general location of SWMUs 108 and 153 An isolated moderate level of carbon tetrachloride was also detected No 1 1 1 TCA DCE and TCE were found in the vicinity of SWMUs 108 and 153

Analytical results indicated the presence of some HSL organics in the soil samples however the organics were likely introduced in the laboratory as discussed in the introduction to Section 4

Plutonium and to a lesser degree americium were elevated above background in the soils surrounding Trench T 1 Plutonium [1 5(0 2) pCi/g] and americium [0 4(0 19) pCi/g] were found in the 0 to 12 foot sample from borehole BH35 87 Plutonium was also found in the 0 5 foot sample from (borehole BH36 87) at a concentration of 0 53(0 16) pCi/g Cesium 137 was also found in this borehole at the 23 foot bedrock sample and 5 15 foot sample at concentrations of 2 3 pCi/g and 2 1 pCi/g respectively Strontium 90 was always detected at less than 1 1 pCi/g The significance of the cesium and strontium is unknown because background levels for these radionuclides have not been characterized

It appears that soil contamination in the vicinity of Trench T 1 is limited to plutonium and americium As with the 903 Pad Area plutonium (and americium) contamination is probably confined to the near surface because elevated levels occur only in soil composites that include the ground surface Concentrations of plutonium were not as high as at the 903 drum storage site which further suggest that historical windblown dissemination of radionuclides from the 903 drum storage site as the

source of the contamination. The solvents detected in soil gas were not detected in the soils nor are they present in the alluvial ground water at well 43 86 [only a trace of  $\text{CCl}_4$  (6 ug/l) and TCE (8 ug/l) was detected during the first quarter of 1987 and these compounds were not detected in the second quarter]. It may be that the soil gas contaminants are originating from SWMU 113 as subsequently discussed.

#### 4.2.2 Solid Waste Management Unit 113 Mound Area

The mound site is located north of Trench T 1 and east of the Oil Burn Pit No 2 as shown on Plate 4.1. This location was revised during the remedial investigation based on a review of historical aerial photography.

Based on the waste management history of this area, the most likely contamination would be uranium, beryllium, and solvents from lathe coolant. Soil gas sampling found high levels of PCE present in the soil gas near the new location of SWMU 113. An isolated occurrence of TCE at a low level was also found approximately 100 feet southeast of borehole BH38 87. No other organics, i.e. DCE, 1,1,1-TCA, or  $\text{CCl}_4$ , were detected in the soil gas in the vicinity of this site.

Analysis of soil samples collected from both boreholes indicated the presence of some HSL organics; however, they occurred at estimated concentrations and/or were present in the laboratory blanks in a concentration on the same order as that seen in the laboratory blanks. However, bis(2-ethylhexyl)phthalate ranged from 2500 to 12,000 ug/kg in the 0.5 foot composite soil sample from BH37 87 and all the soil samples from BH38 87. These concentrations are significantly elevated above any observed blank concentration and therefore bis(2-ethylhexyl)phthalate appears to be present in the soil.



Cesium was found in the 21 foot contact sample from borehole BH37 87 and 20 foot bedrock sample from borehole BH38 87 at concentrations of 47(04) pCi/g and 03(012) pCi/g respectively. The significance of these cesium concentrations is not known because background concentrations have not been characterized. Other radionuclides were not elevated above estimated background levels.

It appears that bis(2 ethylhexyl)phthalate may be a contaminant in the soils of the mound site because it occurred in some of the samples at concentrations significantly greater than what was detected in laboratory blanks. The source of the PCE in the soil gas is contaminated alluvial ground water as PCE has historically been at significantly elevated levels at well 174. TCE has also been at high concentrations in the ground water in this vicinity even though it was only detected at low levels in the soil gas. SWMU 113 is likely the source of this release to ground water but confirmation will require further investigation.

#### 4.2.3 Solid Waste Management Unit 154 Pallet Burn Site

This area is located west of the oil burn pit No. 2. This SWMU was reportedly used to destroy wooden pallets in 1965. The types of hazardous substances and radionuclides that may have been spilled on these pallets is unknown. Two boreholes were drilled in the vicinity of this trench. Borehole BH32 87 was drilled adjacent to the southwest corner of the site and borehole BH31 87 was placed approximately 100 feet west of the southwest corner of the site.

Soil gas sampling indicated moderate levels of PCE in the vicinity of this site. In addition, an isolated low level of TCE was also found. No other organic compounds were detected in the vicinity of the trench during the soil gas survey.

Analytical results from soil sampling of boreholes BH31 87 and BH32 87 indicated the presence of low concentrations of HSL organics some of which may represent contamination 1,2-dichloroethane (1,2-DCA) was detected in all samples with the exception of the 16 foot bedrock contact sample from borehole BH32 87 in low concentrations ranging from 5J to 32 ug/kg PCE occurred in the 0.13 foot (16J ug/kg) and 13 foot (20J ug/kg) bedrock contact samples in borehole BH31 87 Toluene was detected only in the 16 foot bedrock sample from borehole BH31 87 at a concentration of 7J ug/kg Aroclor 1254 a PCB was detected at a concentration of 75 ug/kg in the 0.8 foot sample of borehole BH32 87 The low (generally estimated below detection limits) concentrations of these compounds suggest the soils may be slightly contaminated with solvents Little significance can be placed on this one time reported occurrence of Aroclor 1254

There is no apparent radionuclide contamination in the soils Plutonium was detected at concentrations of 0.15(0.12) pCi/g (0.13 foot duplicate borehole BH31 87) and 0.33(0.17) pCi/g (0.8 foot sample borehole 32 87) however these concentrations may not be significantly higher (statistically) than background

In summary there is no significant contamination of soils at the pallet burn site Very low (estimated below detection limits) concentrations of some HSL organics were detected

#### 4.3 EAST TRENCHES AREA

As discussed in Section 2 the East Trenches Area consists of nine burial trenches used for disposal of mainly flattened depleted uranium and plutonium contaminated drums The trenches are designated T 3 (SWMU 110) and T 4 through

T 11 (SWMUs 1111 1118) and are located just east of the east guard gate at the security area. Trenches T 3 T 4 T 10 and T 11 are located to the north of the east access road and trenches T 5 T 6 T 7 T 8 and T 9 are located south of the road (Plate 4 1). Trench locations as shown on Figure 2 3 were verified and modified slightly based on the magnetometer survey (Appendix B) and field reconnaissance. The only significant location change was Trench T 8 which was moved south approximately 75 feet.

#### 4 3 1 Trench T 3 (SWMU 110)

Solvents (from lathe coolant) plutonium uranium silver (from sewage sludge) and chrome (from sewage sludge) are the contaminants that would most likely be expected in the vicinity of Trench T 3. Boreholes BH39 87 and BH40 87 were drilled to characterize these soils. BH39 87 is approximately 50 feet south of Trench T 3 while BH40 87 is adjacent to the northeast corner of the trench.

In the vicinity of these boreholes there were several locations with moderate levels of PCE and one location with a low level of TCE in the soil gas. Other volatiles were not detected in the soil gas.

As discussed in the introduction to Section 4, chemical analyses of the samples collected from both boreholes shows the presence of organic contaminants but it appears these contaminants may have originated in the laboratory. The presence of these organic compounds in either the laboratory blanks for this batch of samples or in other blanks at similar concentrations and the fact that these organics are common laboratory contaminants suggest that they are not present in the soils in the vicinity of Trench T 3. The source of the PCE and the TCE detected in soil gas is alluvial.

ground water in the vicinity of the trench as evidenced by the data for well 3 74. The source of release of these compounds to ground water may be Trench T 3 but confirmation will require further investigation.

There was only one occurrence of radionuclides above background in the soil samples from these boreholes. Plutonium [11(0.2) pCi/g] was detected above background only in the 0.2 foot sample from BH39 87. This appears to be significantly above background as the upper limit of the background range is 0.10(0.20) pCi/g. Strontium 90 was always less than 1.1 pCi/g and cesium 137 was not detected in the samples.

It is concluded that with the exception of plutonium in the 0.2 foot sample from BH39 87, there is no apparent soil contamination in the vicinity of Trench T 3. The high plutonium concentration in the surficial material at BH39 87 may be characteristic of the general vicinity of Trench T 3, but there are inadequate data to support this conclusion (no surficial data for BH40 87). The plutonium contamination likely has arisen from wind blown dissemination of plutonium from the 903 Pad Area. Although alluvial ground water in the vicinity of Trench T 3 is contaminated with solvents, soils from boreholes BH39 87 and BH40 87 do not show such contamination.

#### 4.3.2 Trenches T 4, T 10, and T 11 (SWMU 111.1, 111.7, and 111.8)

Like Trench T 3, contaminants at Trenches T 4, T 10, and T 11 should include solvents, plutonium, uranium, silver, and chrome. There were six boreholes drilled in the vicinity of these trenches to characterize soil contamination. BH 41 87 and BH42 87 are approximately 200 feet to the northeast and east, respectively, from Trench T

that appears to exist is at relatively low levels. However, as with Trench T 3, alluvial ground water is contaminated with solvents which is the likely source of TCE and PCE detected in the soil gas. A determination of the extent to which Trenches T 4, T 10, and T 11 are the source of this release to ground water will require further investigation.

#### 4.3.3 Trenches T 5 through T 9 (SWMUs 111.2, 111.6)

Based on historical waste management practices at these trenches, solvents, uranium, and plutonium are the contaminants that may be expected in the soils. Boreholes BH47-87 through BH55-87 were drilled in the vicinity of the trenches to characterize any soil contamination. BH47-87, BH53-85, BH55-87, and BH56-87 are north of the trenches, while BH48-87, BH49-87, BH50-87, BH51-87, BH52-87, and BH54-87 are to the south.

In the vicinity of all the trenches to the south of the east access road, PCE, TCE, and 1,1,1-TCA were detected in the soil gas at several locations. PCE was most pervasive, generally occurring at low levels with one moderate level near BH50-87. TCE and 1,1,1-TCA were sporadically present at low levels.

Similar to the findings for the trenches to the north of the east access road, methylene chloride, N-nitrosodiphenylamine, di-n-octyl phthalate, and bis(2-ethylhexyl)phthalate occurred in most of the samples but were also present in most of the laboratory blanks in concentrations of the same order of magnitude. However, acetone was pervasive in the soils at concentrations often greater than three times that observed for laboratory blanks and sometimes an order of magnitude greater. The acetone ranges in the soils are summarized below.

<u>Borehole</u>	<u>Concentration Range (ug/kg)</u>	<u>Comment</u>
47 87	8J 820	Higher concentrations below 16 depth
48 87	100 1200	Highest concentration at the 13 contact
49 87	91 710	Occurs throughout the borehole
50 87	510 1000	Occurs throughout the borehole
51 87	72 1700	Occurs throughout the borehole
52 87	43-94	Occurs throughout the borehole
53 87	58 130	To a depth of 8
53 87	430 2400	Below 8
54 87	29 1600	Occurs throughout the borehole but is generally 200 300 ug/kg
55 87	300 1200	Occurs throughout the borehole
56 87	74 120	Only detected below the water table

It appears from the above data that there may be acetone contamination throughout the soils in this area with the highest concentrations occurring at depth. This implies a plume of acetone exists possibly originating from these trenches however concentrations of acetone in the low hundreds ug/l also exist in the soils in the vicinity of the trenches to the west which may indicate yet another source of acetone.

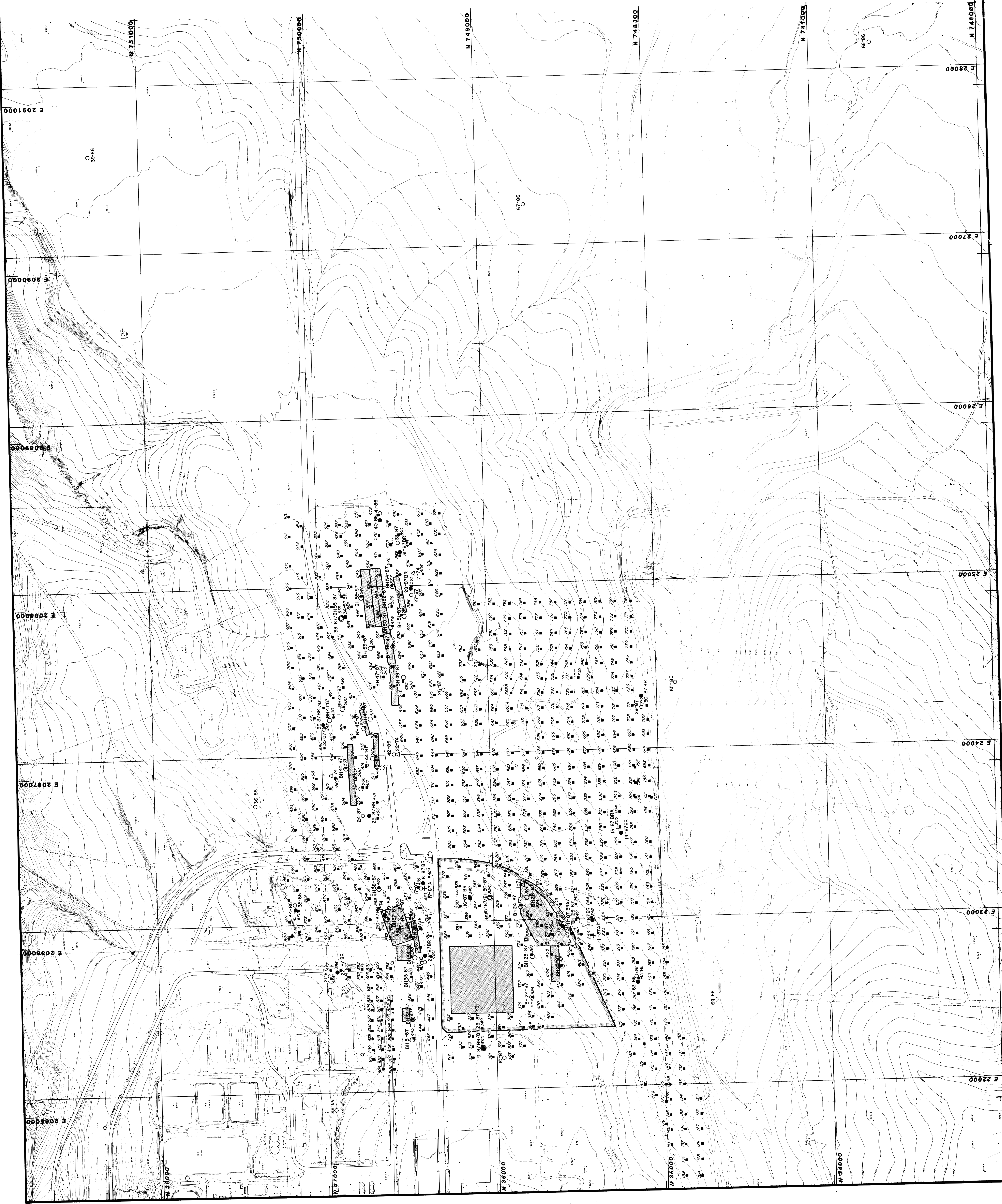
1,2 DCA appeared in many of the samples from the boreholes was frequently at concentrations above detection limits and never appeared in the blanks. The only borehole where 1,2 DCA did not appear was BH56 87 which is furthest from the trenches to the north. The lowest concentrations were at BH51 87 and BH54 87 located adjacent to Trench T 8 which is the trench furthest to the south. These concentrations were estimated values below detection limits. The 0.2 foot sample from BH54 87 had 120 ug/kg of 1,2 DCA and 190 ug/kg of toluene. This sample and the 8 foot sample in BH54 87 are the only occurrences of toluene in any sample from boreholes in the east trenches area. Samples from BH53 87 also had 1,2 DCA.

concentrations near or below detection limits Except for BH56 87 BH53 87 is furthest from the trenches to the north All other boreholes are located adjacent to trenches T 5 T 6 T 7 and T 9 immediately to the north and south Generally the highest concentrations of 1 2 DCA were found in BH47 87 BH56 87 and BH50 87 Concentrations of 110 and 98 ug/kg were present in 15 foot bedrock contact and 17 foot bedrock samples of BH50 87 (just south of Trench T 7) Concentrations ranged from 38 120 ug/kg in the 7 samples taken from the bedrock contact and bedrock materials from BH47 87 (just north of Trench T 9) and BH55 87 (just north of Trench T 5) Like acetone there appears to be a release of 1 2 DCA to alluvial ground water in the vicinity of these trenches

At the time of this writing radiochemical results are only available for BH47 87 BH53 87 and BH56 87 Soil samples from BH47 87 and BH56 87 had radionuclide concentrations within background levels The 0 2 foot and the 2 3 5 foot soil samples from BH53 87 contained plutonium at 6(0 2) pCi/g and 0 98(0 24) pCi/g respectively In all samples strontium was less than 0 5(0 6) pCi/g and cesium was 0(0 1) except one occurrence of cesium at 0 1(0 1) pCi/g As with other sites the high plutonium in the upper soils suggests the contamination arose from wind blown dissemination of plutonium from the 903 drum storage site

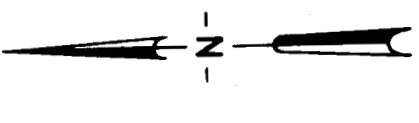
It is concluded that contamination of soils in the vicinity of the trenches south of the east access road is limited to plutonium 1 2 DCA and possibly acetone Other HSL organics that were detected likely represent laboratory artifact The 1 2 DCA contamination appears to be confined to the bedrock material and plutonium contamination appears to be confined to the surface The highest concentrations of acetone were also at depth





EXPLANATION

- SWMU Location
- Soil Gas Sample Location and Reference Number
- 4-87 Alluvial Monitor Well
- 5-87BR Bedrock Monitor Well
- 1-74 Pre-1986 Monitor Well
- 7-87 BRA Abandoned Hole
- BH 11-87 Borehole



Contour Interval: 2'  
Scale: 1" = 200'

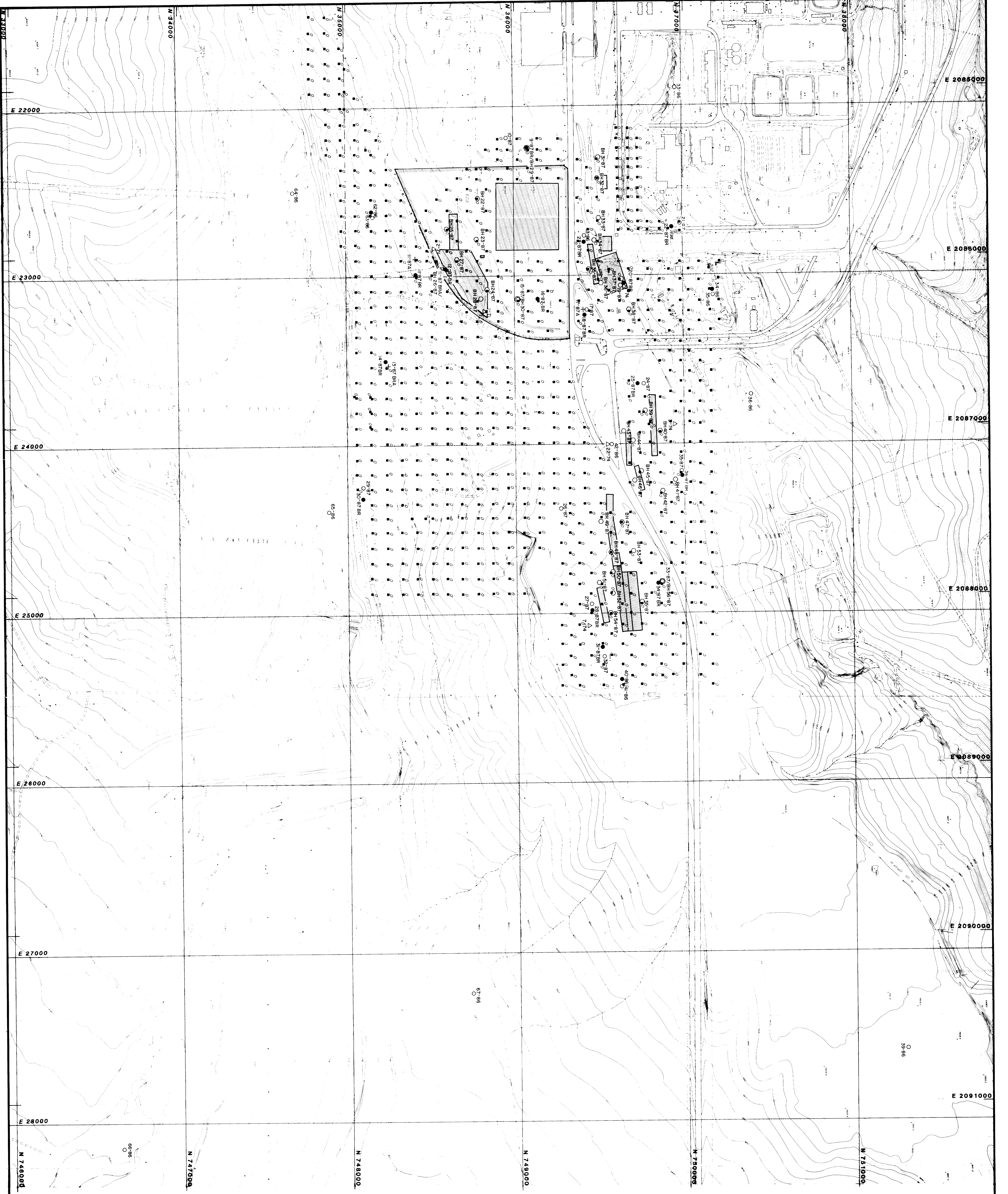


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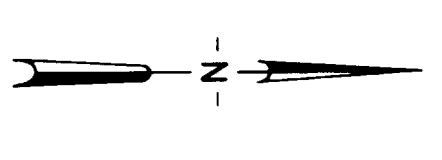
Plate 4-2  
903 Pad, Mound, East Trenches Areas  
SOIL GAS SAMPLE LOCATIONS





**EXPLANATION**

- SWMU Location
- Soil Gas Sample Location
- 4-87 Alluvial Monitor Well
- 5-87BR Badrock Monitor Well
- 1-74 Pre-1986 Monitor Well
- 7-87 BRA Abandoned Hole
- BH 11-87 Borehole

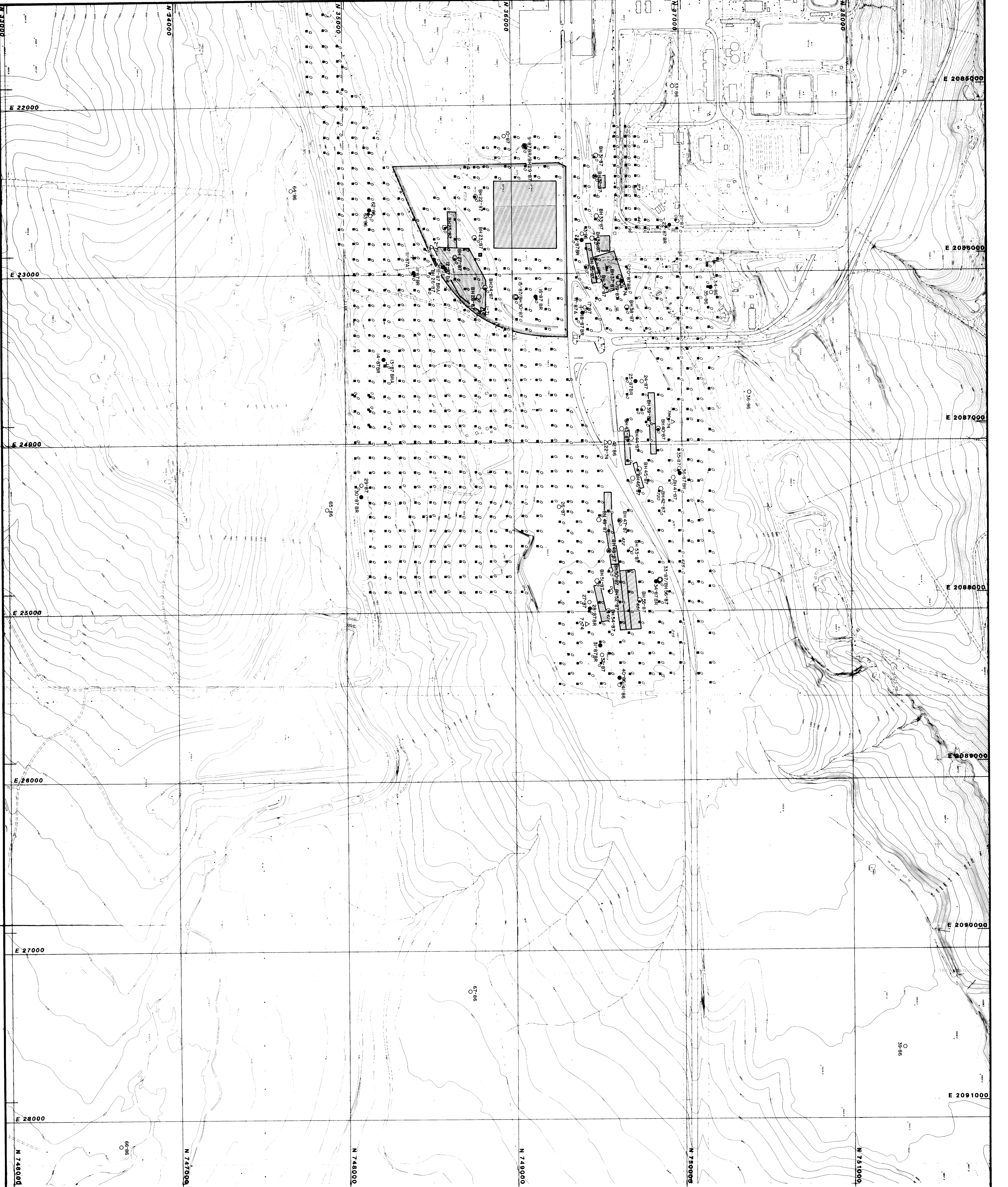


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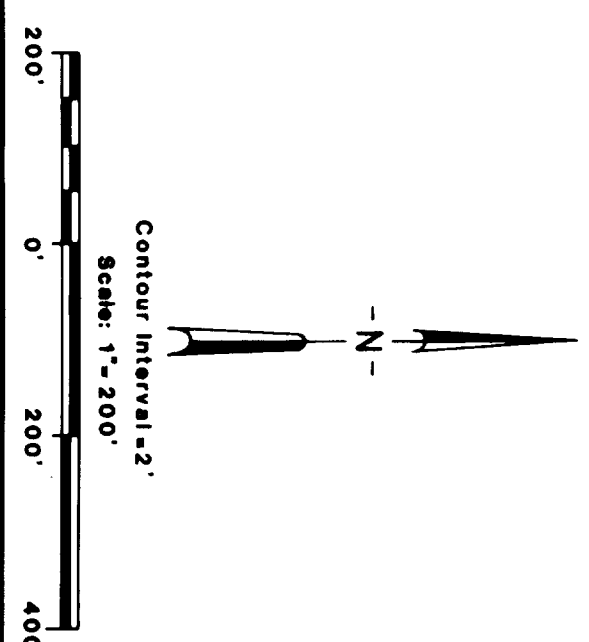
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Plate 4-7  
903 Pad, Mound, East Trenches Areas  
DICHLOROETHENE MOLECULAR COUNTS  
IN SOIL GAS





- EXPLANATION**
- SWMU Location
  - Soil Gas Sample Location
  - Alluvial Monitor Well
  - Bedrock Monitor Well
  - Pre-1988 Monitor Well
  - Abandoned Hole
  - Borehole



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903 Pad Mound, East Trenches Areas  
1,1,1 TRICHLOROETHANE MOLECULAR COUNTS  
IN SOIL GAS

Plate 4-6  
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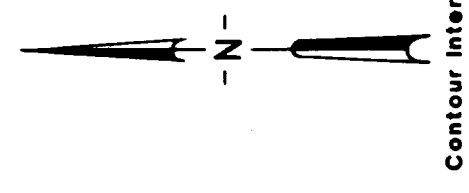






### EXPLANATION

- |   |                          |
|---|--------------------------|
|  | SWMU Location            |
|  | Soil Gas Sample Location |
|  | Alluvial Monitor Well    |
|  | Bedrock Monitor Well     |
|  | Pre-1986 Monitor Well    |
|  | Abandoned Hole           |
|  | Borehole                 |



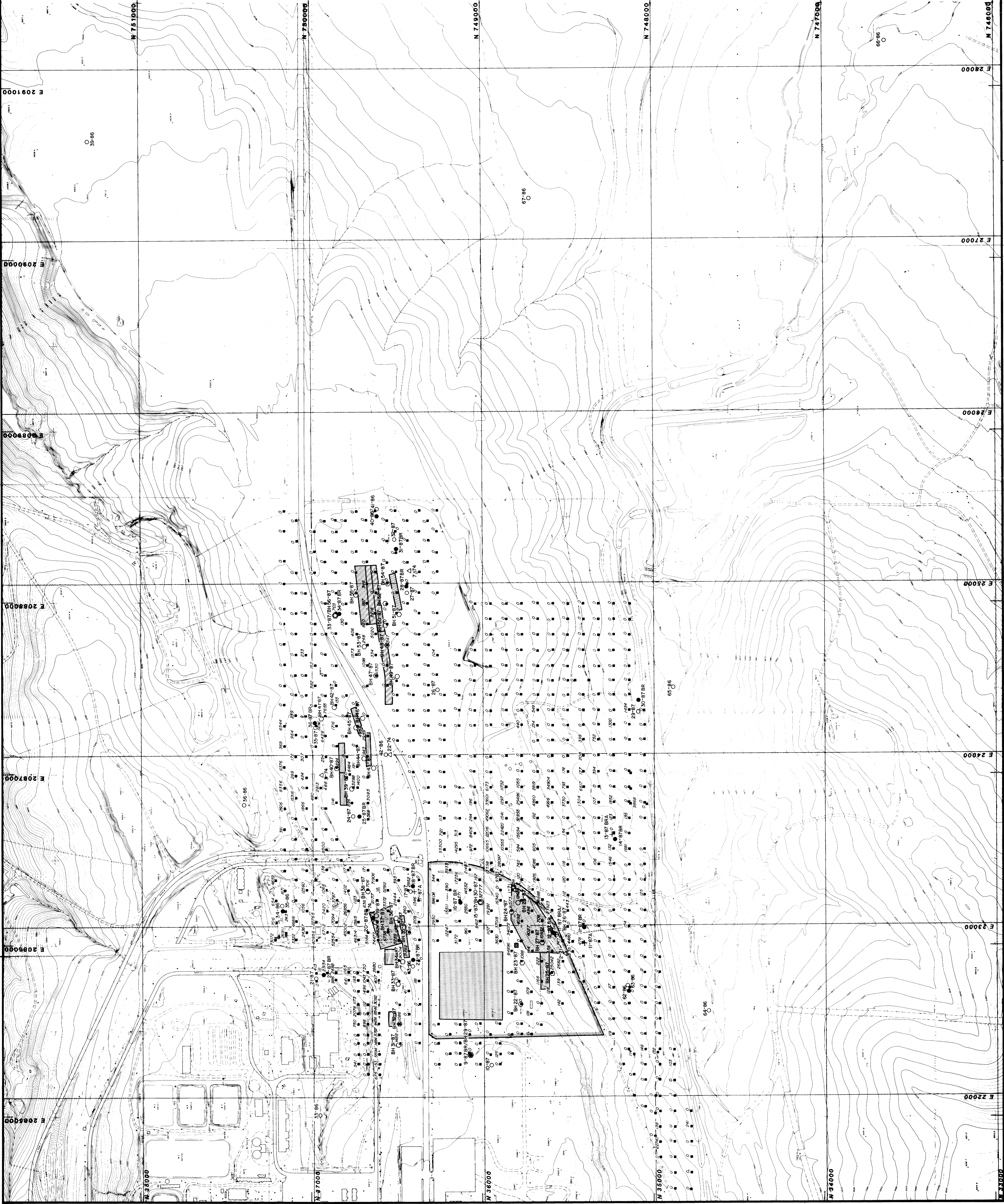
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**Plate 4-4**

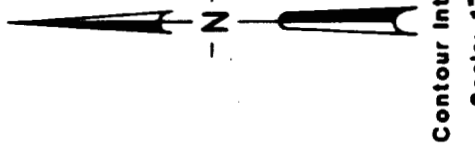
**903 Pad, Mound, East Trenches Areas  
TRICHLOROETHENE MOLECULAR COUNTS  
IN SOIL GAS**





EXPLANATION

- SWMU Location
- Soil Gas Sample Location
- 4-87 Alluvial Monitor Well
- 5-97BR Bedrock Monitor Well
- 1-74 Pre-1986 Monitor Well
- 7-87 BRA Abandoned Hole
- BH 11-87 Borehole



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Plate 4-3  
903 Pad, Mound, East Trenches Areas  
TETRACHLOROETHENE MOLECULAR COUNTS  
IN SOIL GAS

December 31, 1987